SERVICE MANUAL

MULTICARE

Date 08/2014
Version 08

Multicare – Service Manual

Positionable bed for critical care

Author: LINET, s. r. o.
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1 Introduction – General information

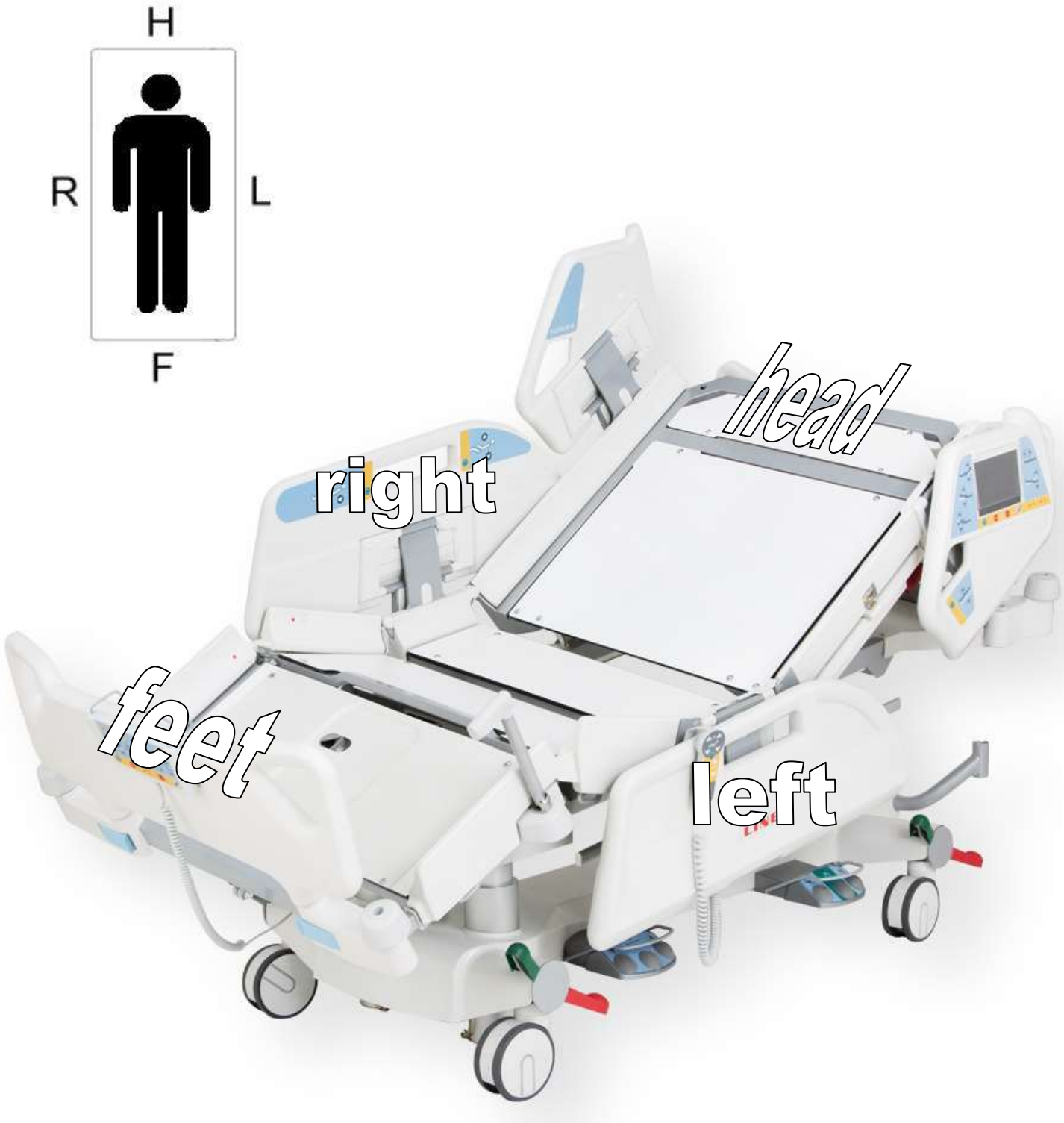
1.1 Product label and technical label – location

1.1.1 Product label description

1.1.2 Technical label description

Symbols and labels on the product	
	Transformer thermal protection
	Only suitable for indoor use
	Protection against accidents due to electrical current – Type B instrument
	Safe isolating transformer, general
	Connection of conductor for potential equalisation
	Safe working load
	Warning against crushing or entrapment
	Maximum weight of patient
	Use only mattress recommended by manufacturer
	Read instructions for use
	Attention – consult accompanying documents

1.2 Identification of bed parts



1.3 List of tools and equipment needed for servicing the bed

Tools
Socket set
Screwdriver set
Engineer‘s wrench set
Hex key bit set
Torx bit set
Hex key set
Knife
Set of pliers
Torque wrench
Hammer, nylon hammer
Tape measure
Crimping tool for RJ connectors
Multimeter

2 Technical data

2.1 Conditions of use

US parameters	Values
Temperature	+50 °F — +104 °F
Humidity	30 — 75 %
Atmospheric pressure	20,7 — 31,3 inHg

EU parameters	Values
Temperature	+10 °C — +40 °C
Humidity	30 — 75 %
Atmospheric pressure	700 — 1060 hPa

2.2 Mechanical data

Parameters	Values
Outer dimensions (siderails up)	215 x 105 cm / 84,65‘ x 41,34‘
Bed extension	0 – 22 cm / 0‘ – 8,66‘
Recommended mattress dimensions	208 × 86 x 14 cm / 81,89‘ x 33,86‘ x 5,51‘
Max. mattress height	23 cm / 9,06‘
Bed height	44 – 82 cm / 17,32‘ x 32,28‘
Backrest adjustment	70°
Thigh rest adjustment	35°
Lateral tilt	+30°/-30°
Trendelenburg / anti-Trendelenburg position	+13°/-16°
Siderail height (above mattress platform)	45 cm / 17,72‘
Weight /basic equipment/	225 kg
Safe working load (SWL)	250 kg
Max. lifting pole load	75 kg

2.3 Electrical data

Parameters	Values
Input voltage	230 V, +/- 10%, 50 — 60 Hz 100 - 127V, +/- 10%, 50 — 60 Hz
Maximum power input	max. 1,6 A (input 230V), 370 VA max. 3,7A (input 100–127V), 370VA
EN 60529 safety protection	IP 54
Safety class	Class I
Applied part	Type B
Duty cycle	10%, max. 2 min. out of 18 min.

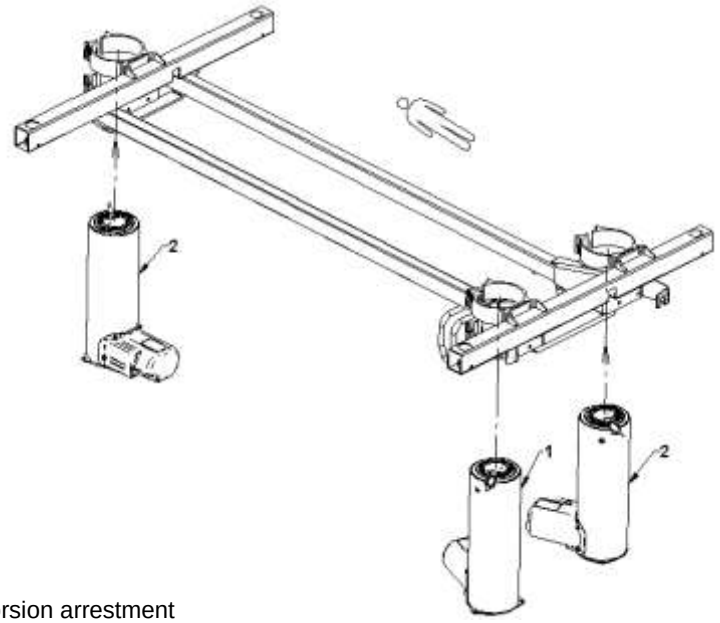
NOTE *Upon request, LINET® can deliver critical care beds with electrical specifications that comply with regional standards (custom voltage, different mains plugs).*

3 Components

3.1 Location and description of parts located on bed

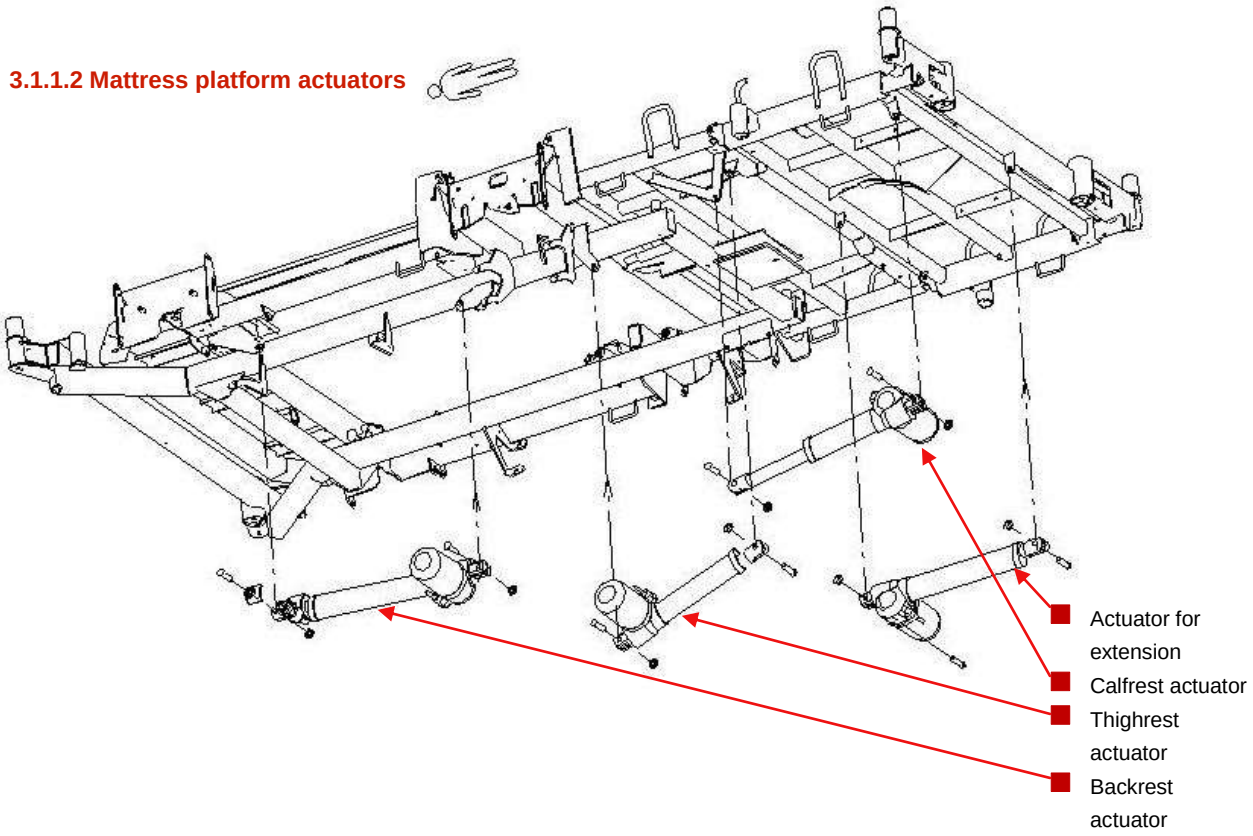
3.1.1 Electronic components

3.1.1.1 Columns

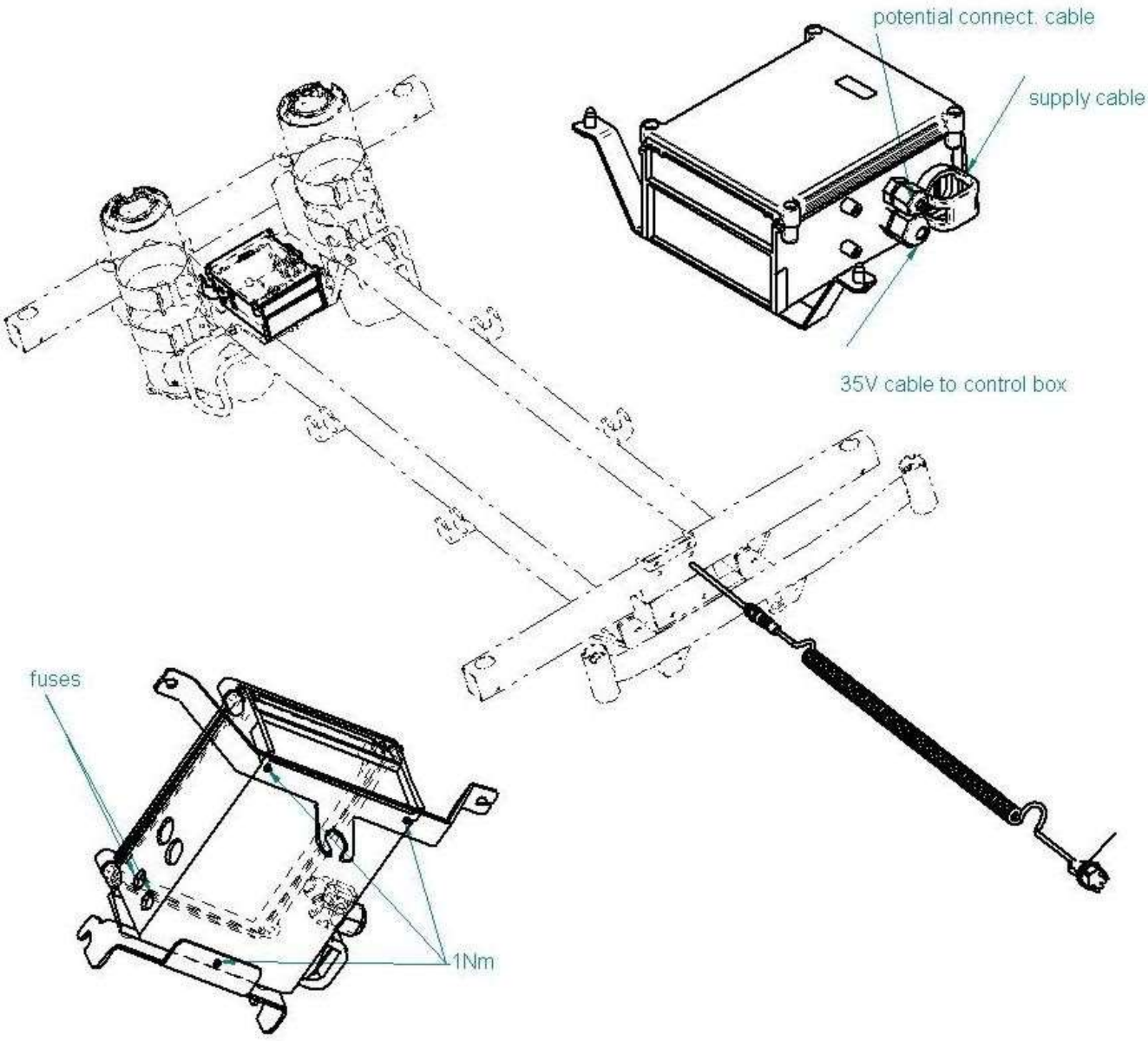


1) Column without integrated torsion arrestment
2) Column with integrated torsion arrestment

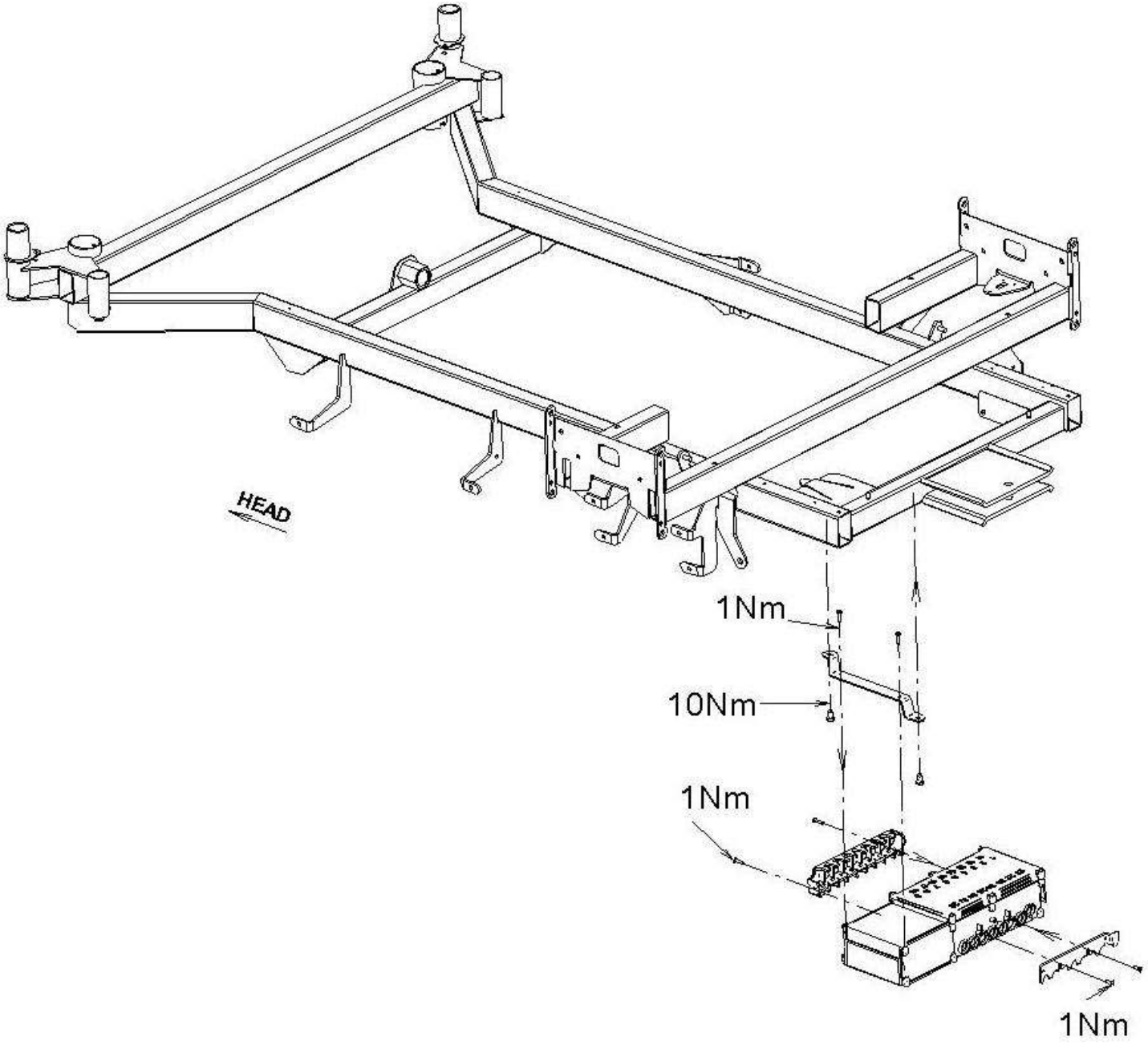
3.1.1.2 Mattress platform actuators



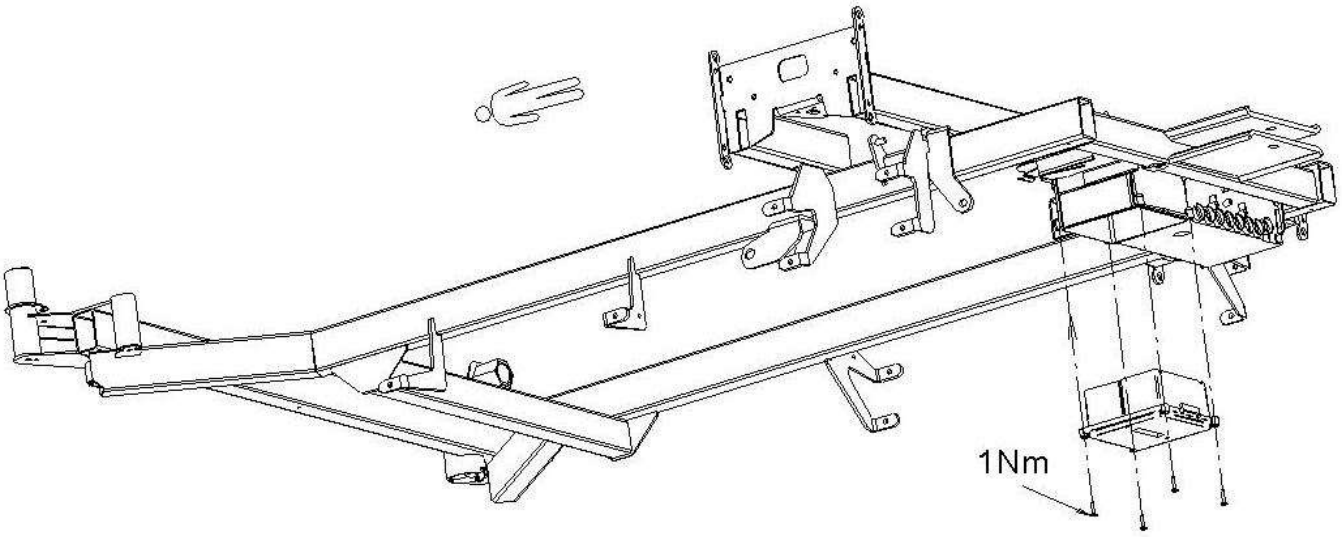
3.1.1.3 Power box, fuses and power cable



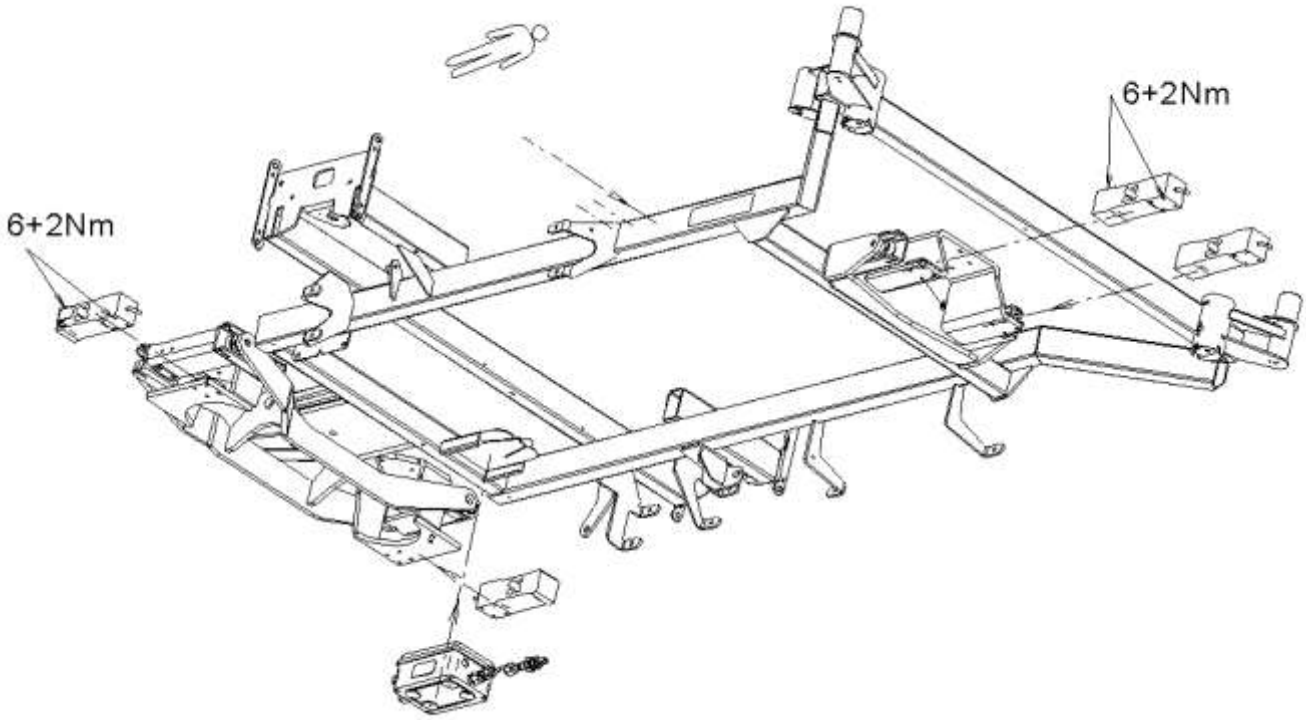
3.1.1.4 Mains control box



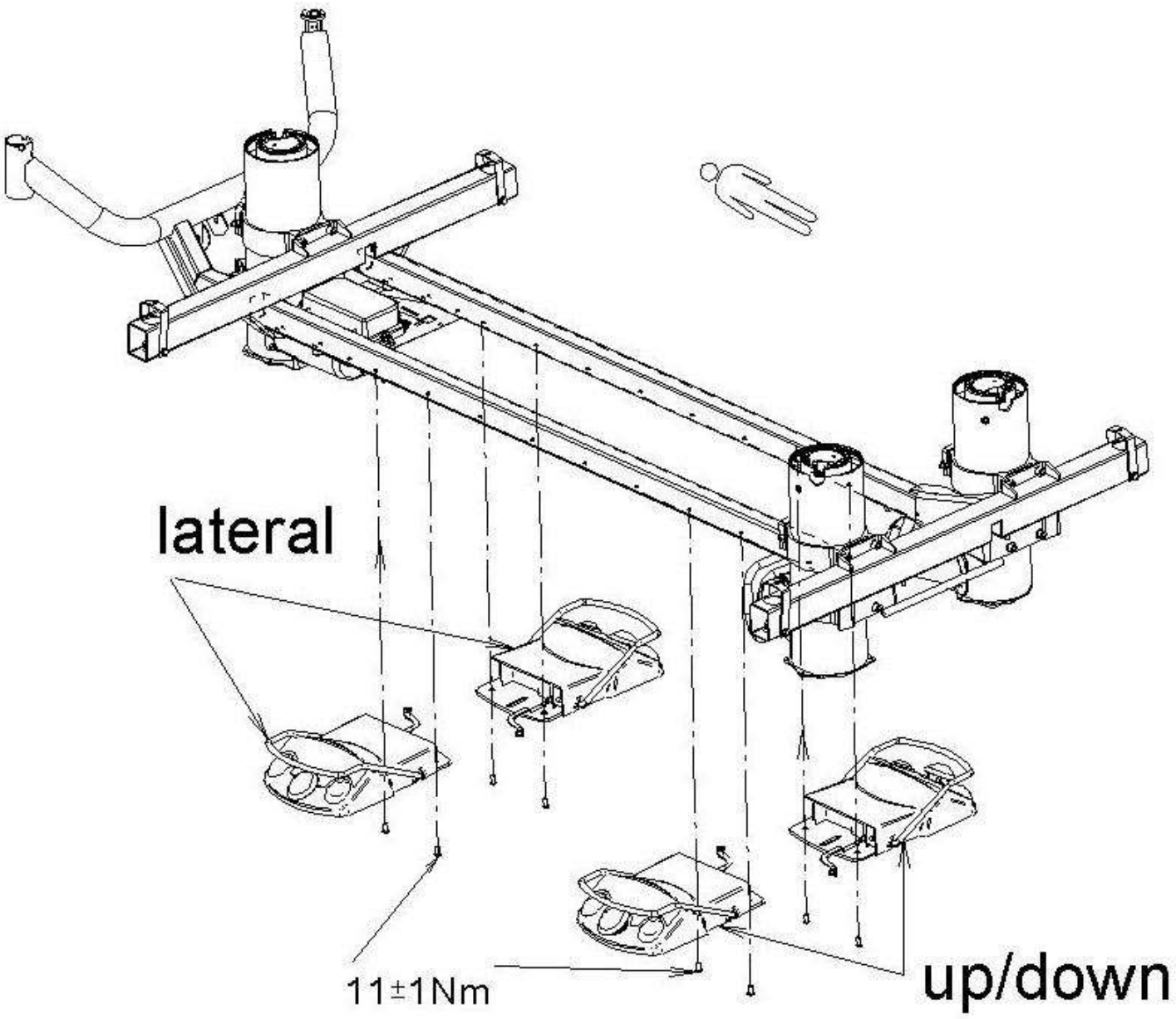
3.1.1.5 Battery



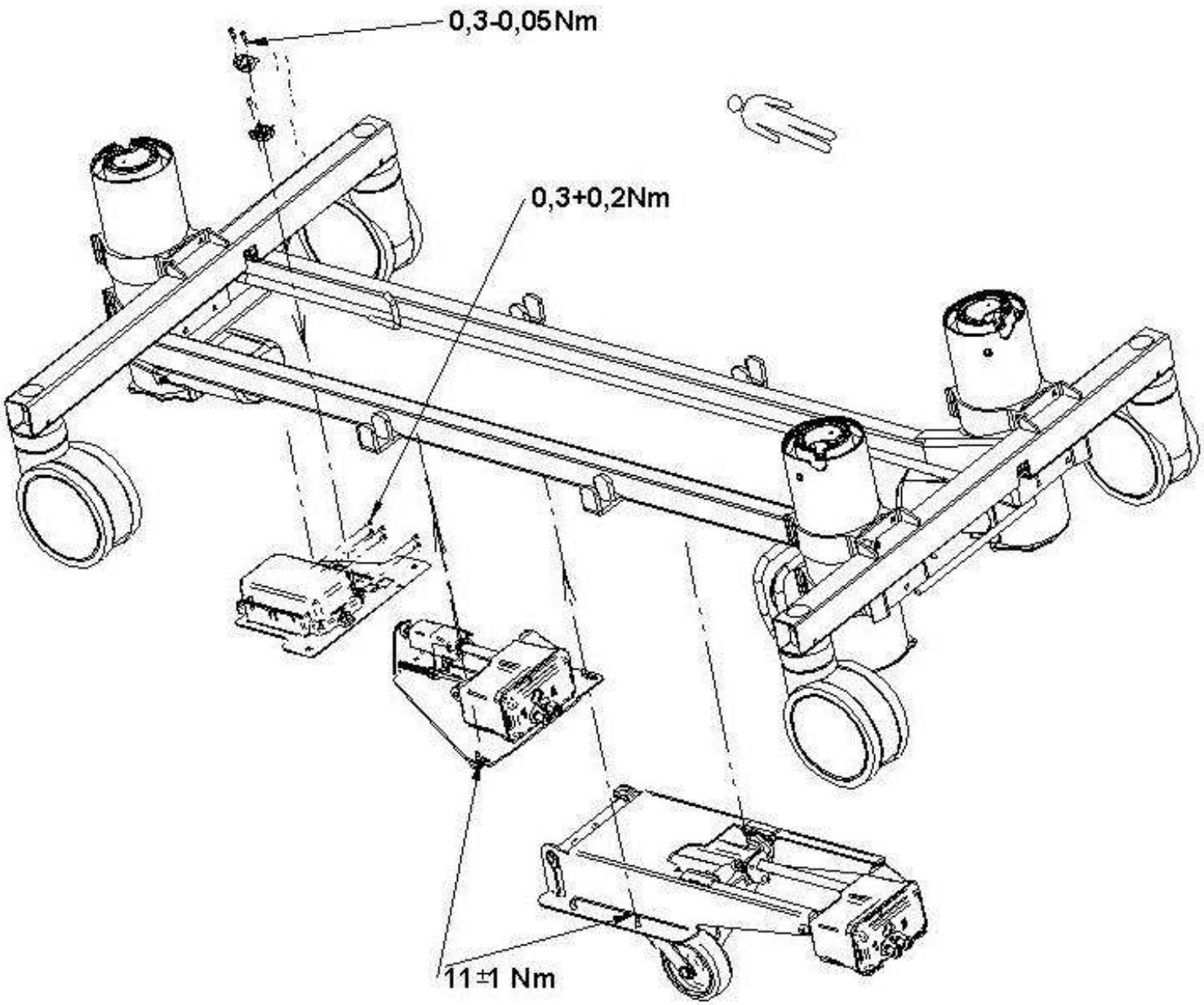
3.1.1.6 Weight module and tensometers



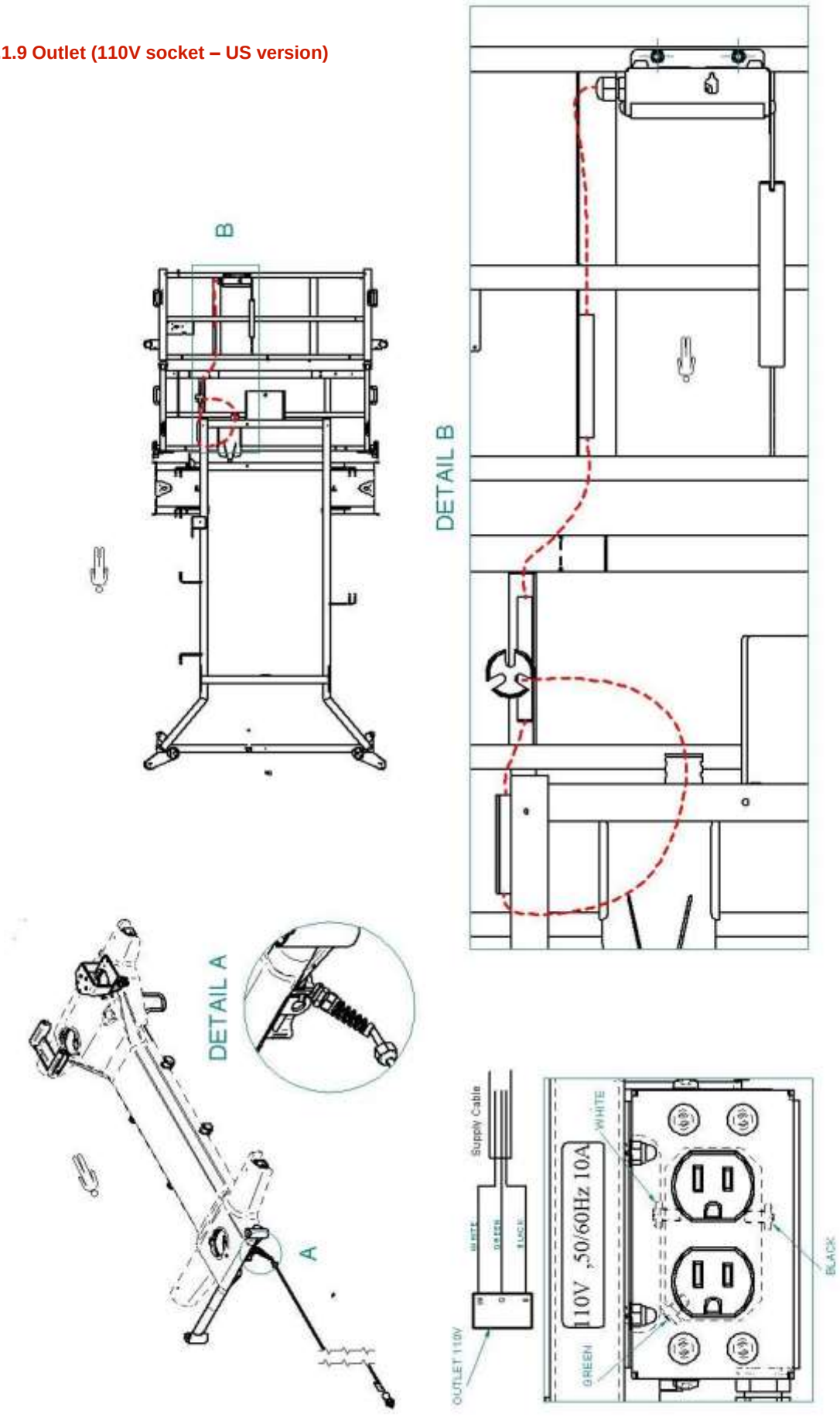
3.1.1.7 Foot controls



3.1.1.8 5th castor and I-brake

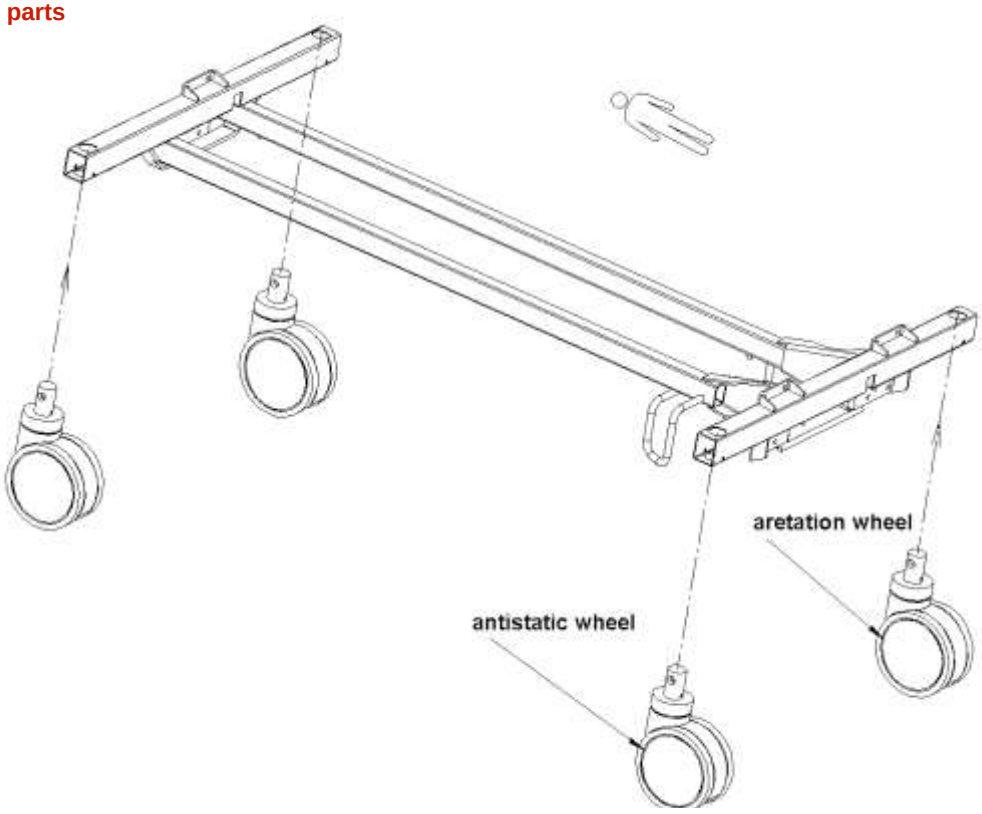


3.1.1.9 Outlet (110V socket – US version)

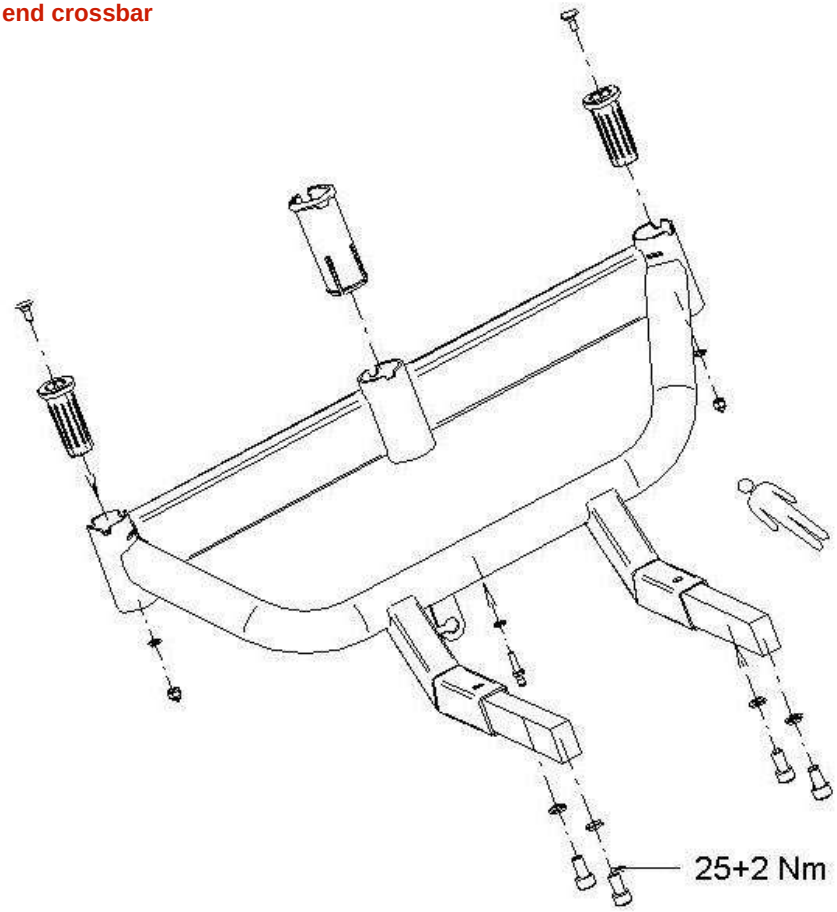


3.1.2 Mechanical parts

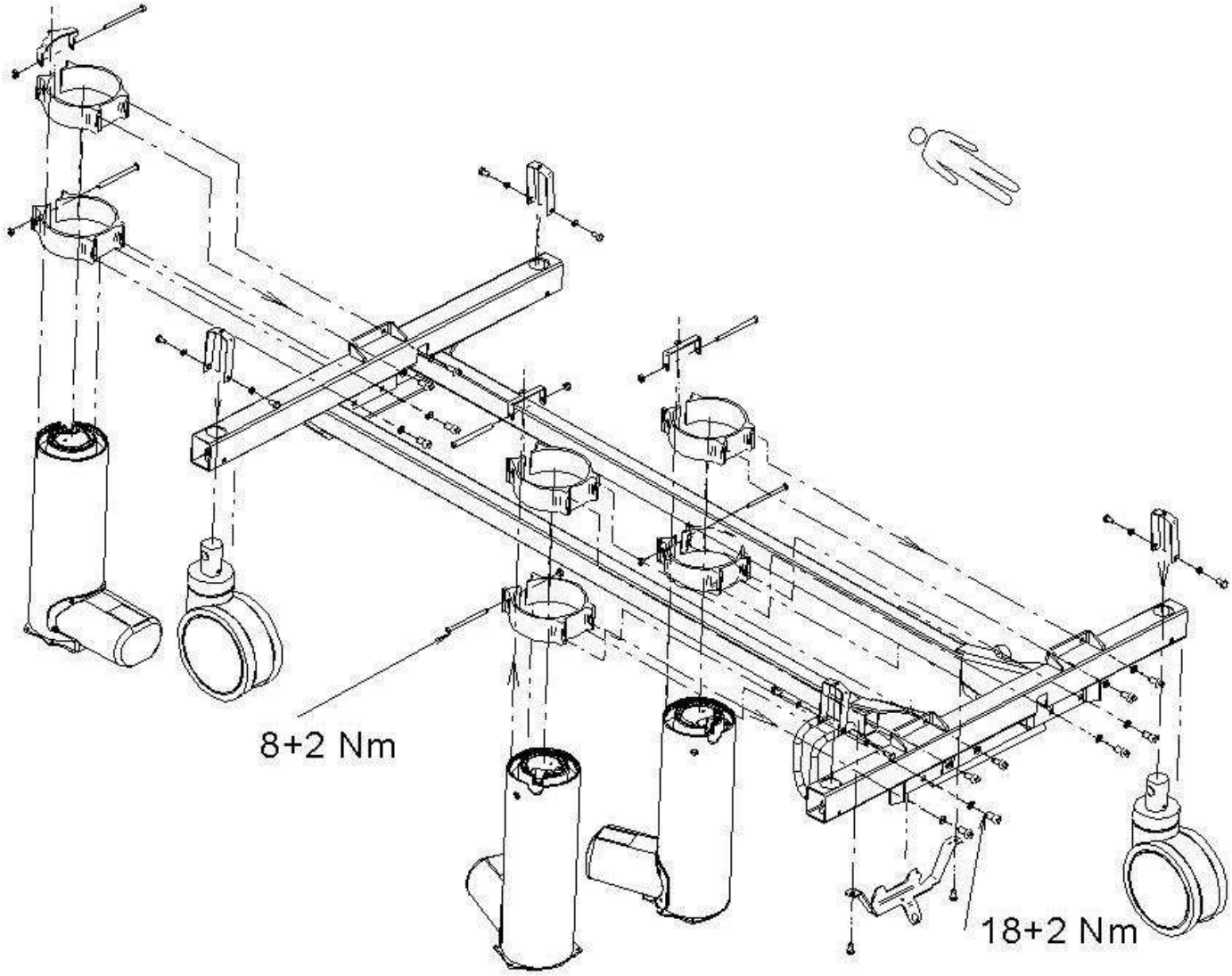
3.1.2.1 Castors



3.1.2.2 Head end crossbar

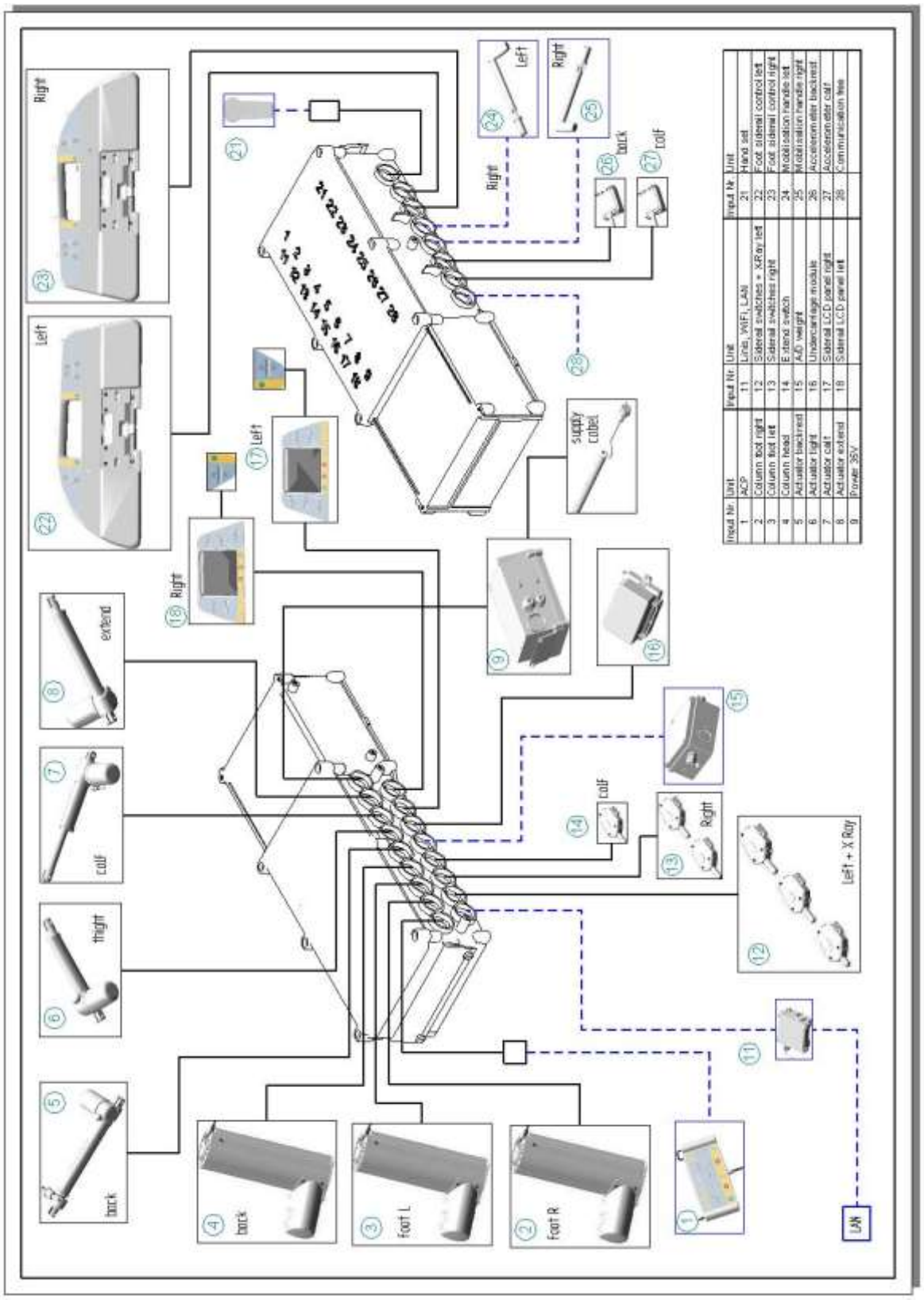


3.2 Column unit torque values

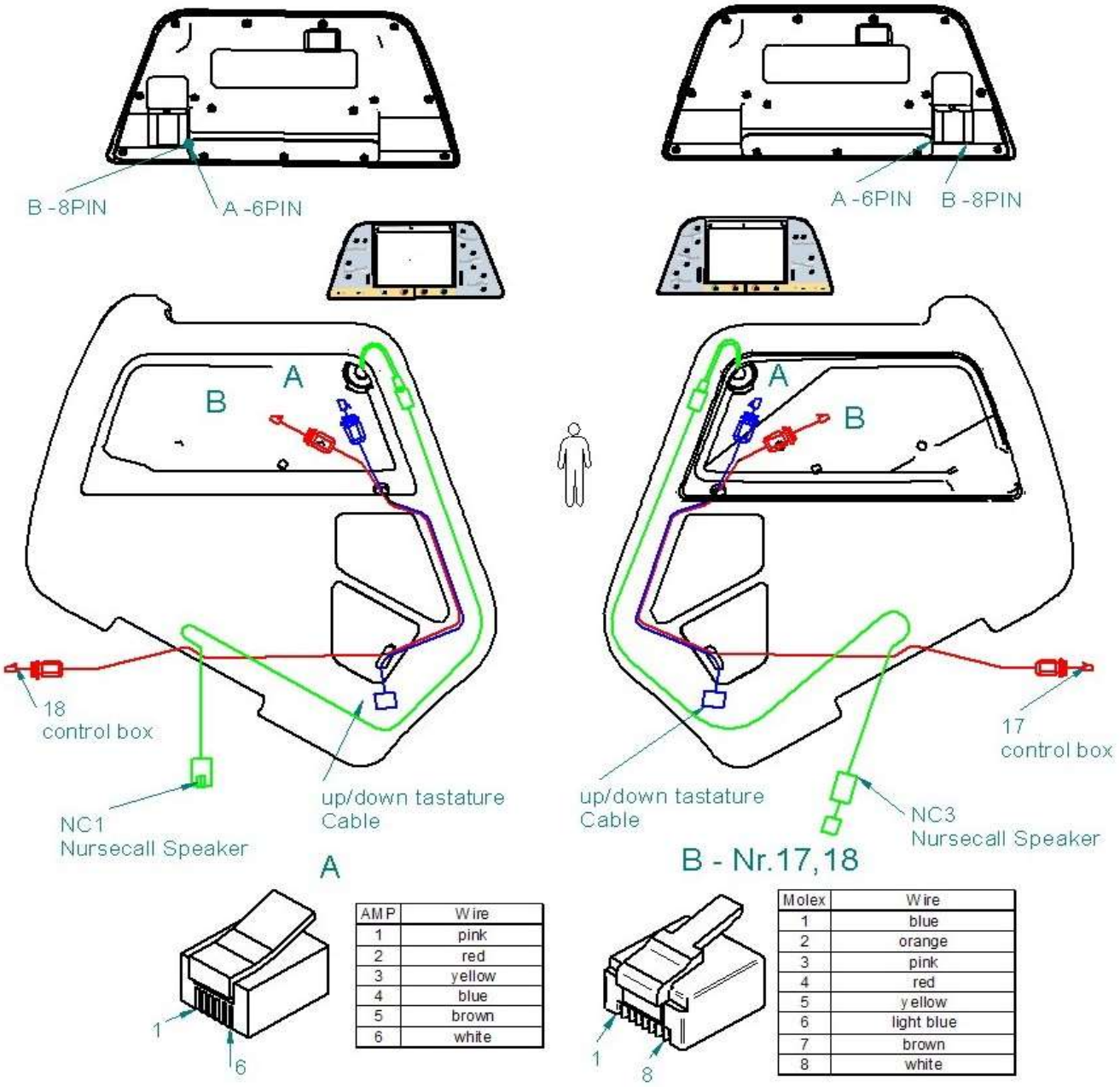


4 Electrical devices – component connection

4.1 Bed wiring diagram



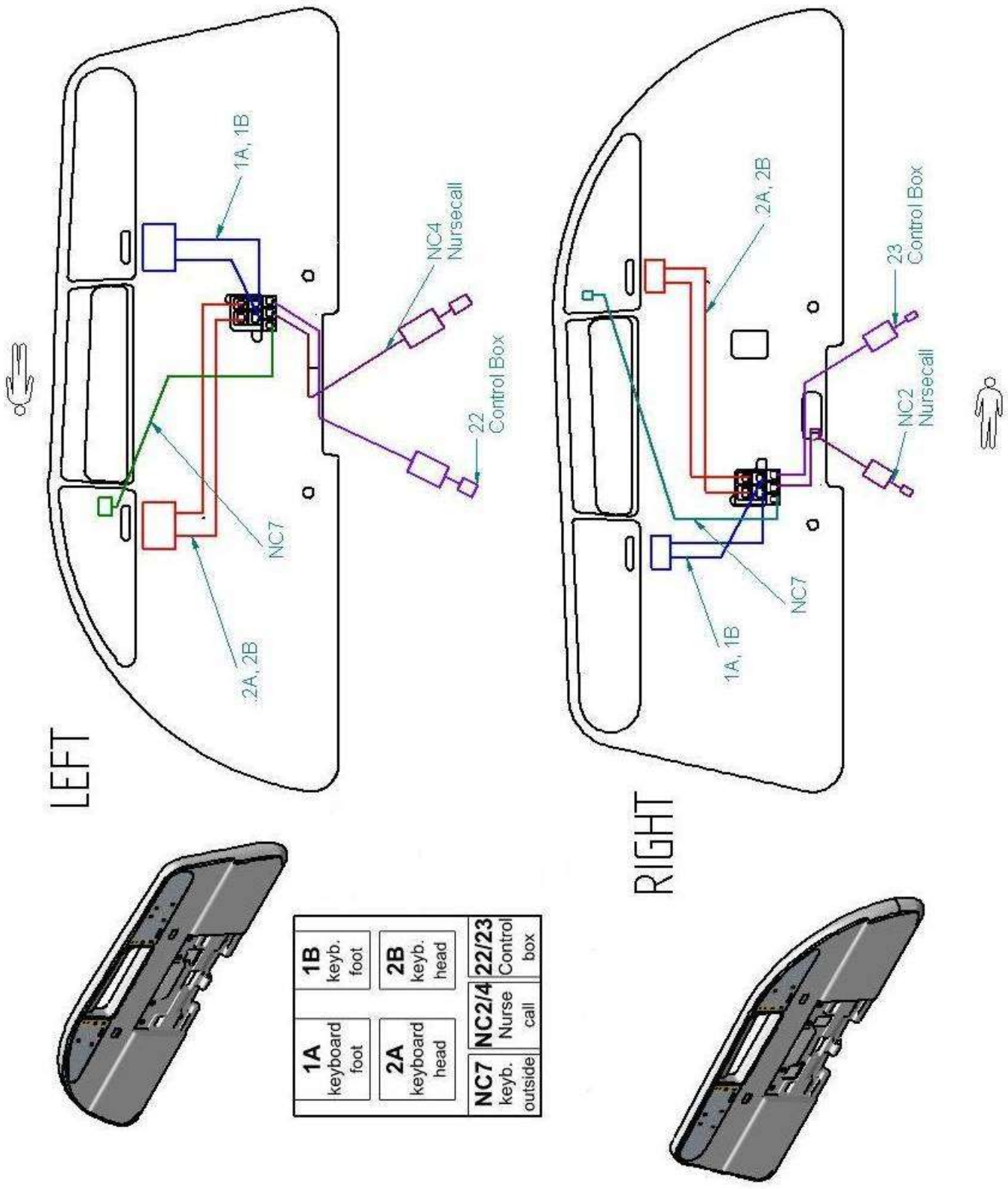
4.2 Head siderail



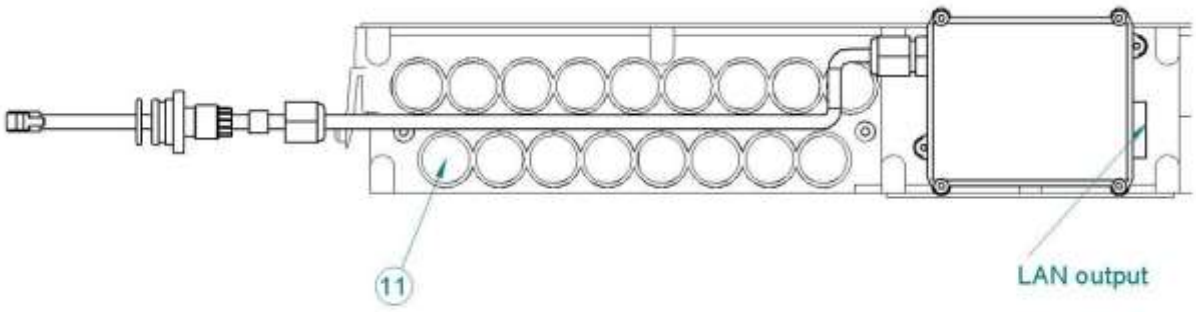
AMP	Wire
1	pink
2	red
3	yellow
4	blue
5	brown
6	white

Molex	Wire
1	blue
2	orange
3	pink
4	red
5	yellow
6	light blue
7	brown
8	white

4.3 Foot siderail

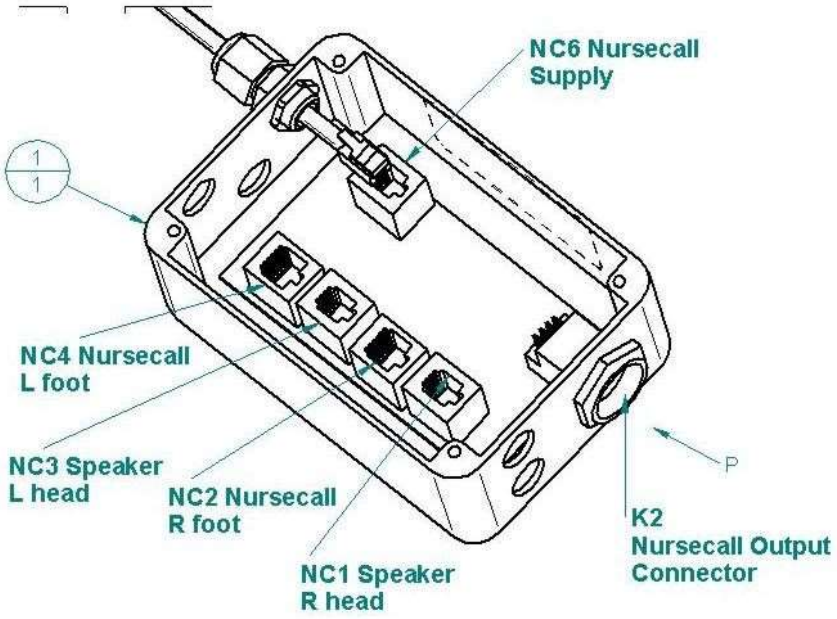


4.4 Wi-fi (LAN) module



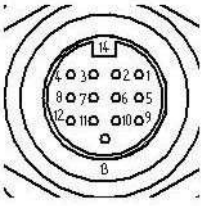
4.5 Nursecall

Connector	PIN	Function
K1 Nursecall Supply	4	+
	3	Bed Exit
	2	-
	1	Nursecall

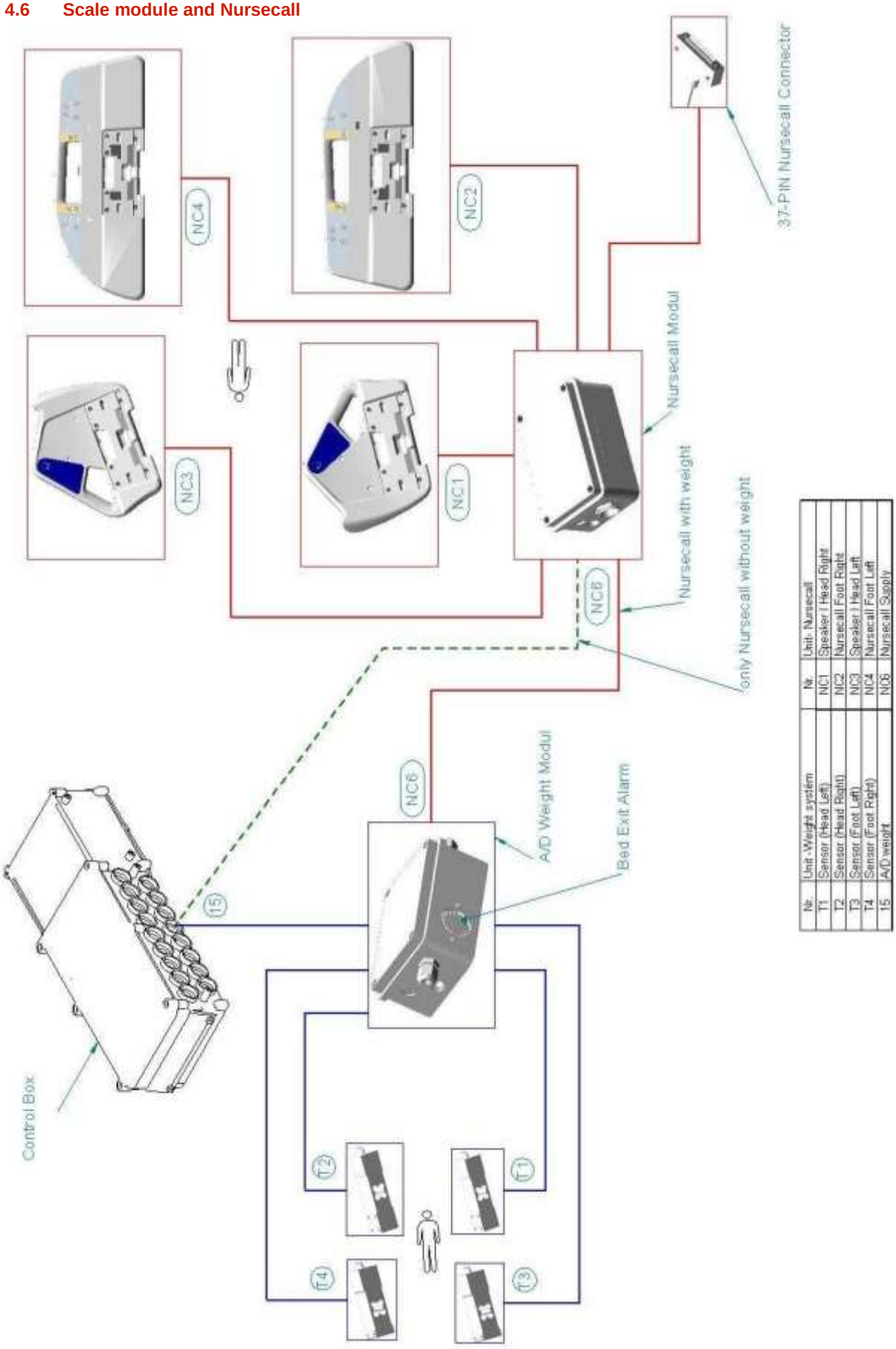


Connector	PIN	Function
K2 Nursecall output	1	-green LED
	2	+green LED
	3	-red LED
	4	+red LED
	5	Bed exit
	6	Bed exit
	7	Nursecall
	8	Nursecall
	9	Speaker com
	10	Speaker -R
	11	Speaker -L

P
2:1
connector view
female



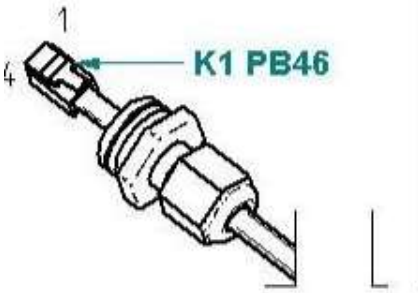
4.6 Scale module and Nursecall



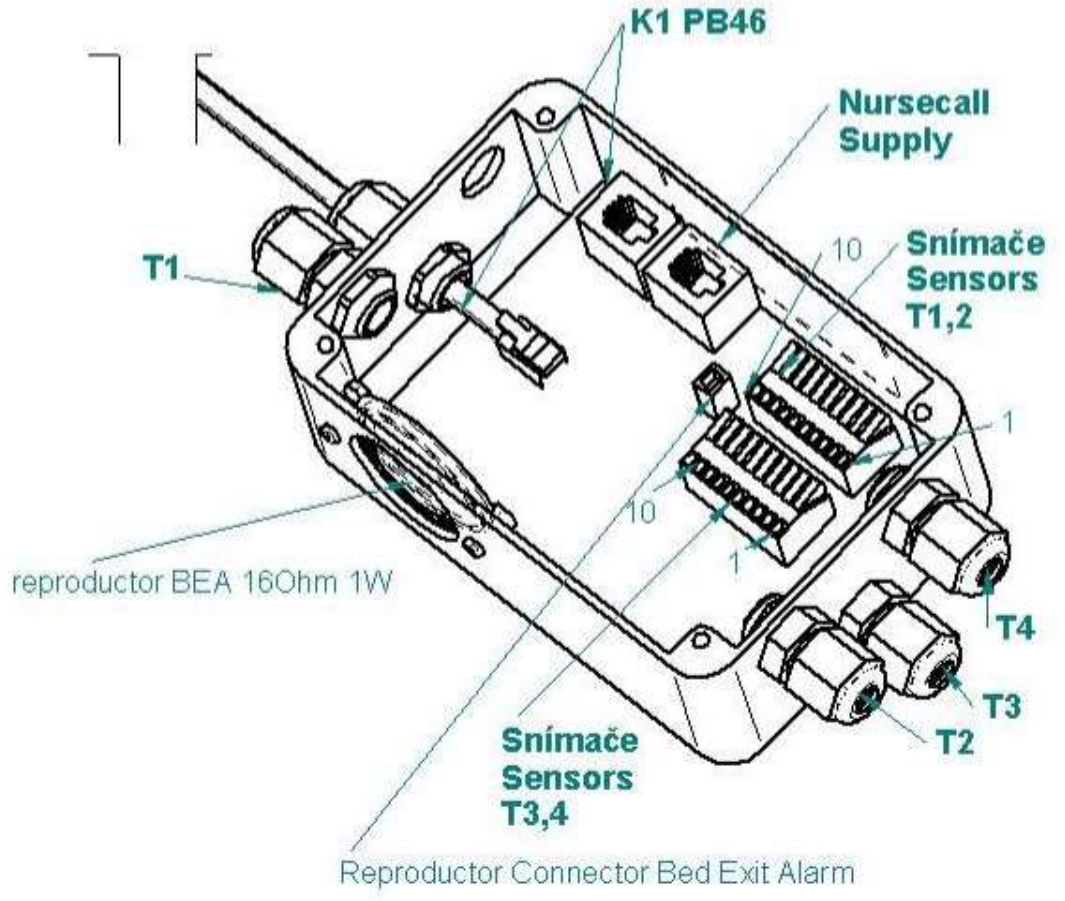
4.7 Scale tensometers

Model number of tensometer			8300-0674 (old)	8300-0674A (new)	Model number of tensometer			8300-0674 (old)	8300-0674A (new)
Sesnsors T1, T2	PIN	Meaning	Colour	Colour	Sensors T3, T4	PIN	Meaning	Colour	Colour
	1	T1 shielding	transparent	transparent		1	T3 shielding	transparent	transparent
	2	T1 – supply	black	brown		2	T3 – supply	black	brown
	3	T1 + Output	green	green		3	T3 + Output	green	green
	4	T1 – Output	white	white		4	T3 – Output	white	white
	5	T1 + supply	red	yellow		5	T3 + supply	red	yellow
	6	T2 shielding	transparent	transparent		6	T4 shielding	transparent	transparent
	7	T2 – supply	black	brown		7	T4 – supply	black	brown
	8	T2 + Output	green	green		8	T4 + Output	green	green
	9	T2 – Output	white	white		9	T4 – Output	white	white
	10	T2 + supply	red	yellow		10	T4 + supply	red	yellow

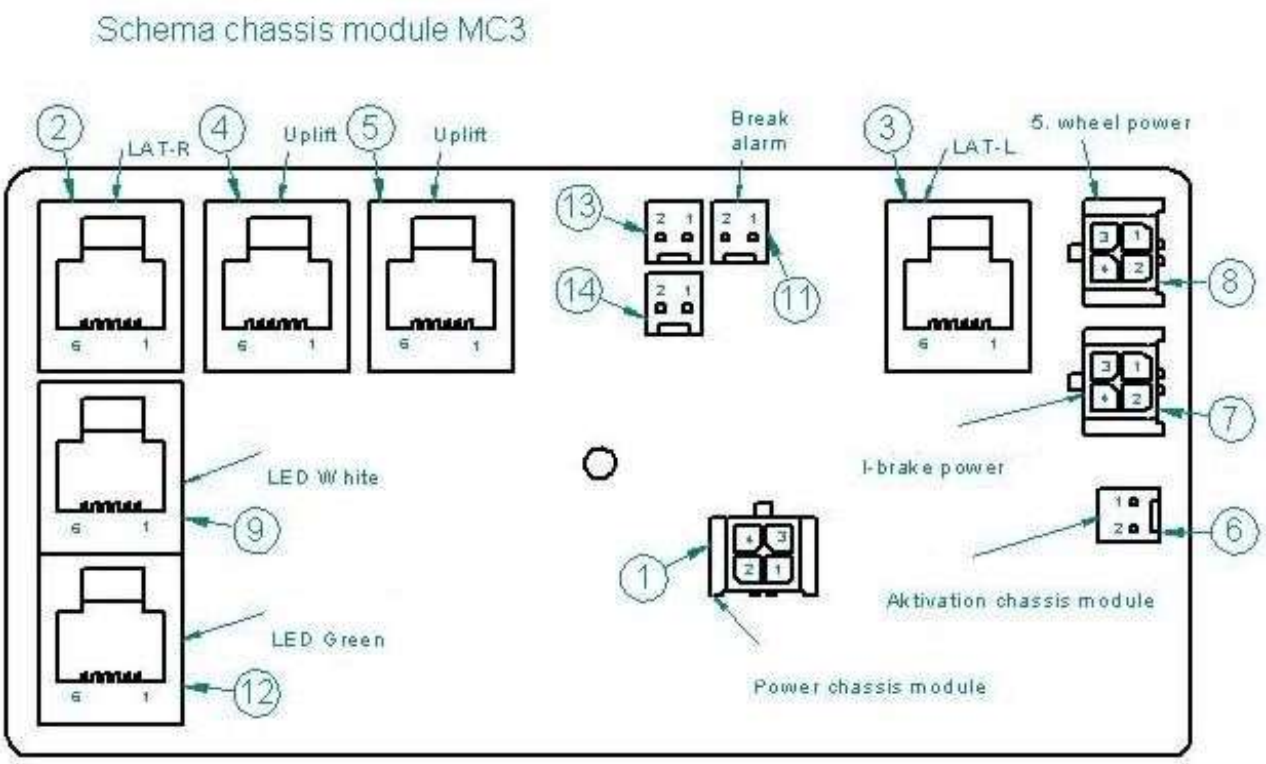
NOTE: *Tensometers 8300-0674A are used since 08/2013!!*



Connector	PIN	Meaning
K1 PB46	1	+
	2	Tx
	3	-
	4	Rx



4.8 Undercarriage module



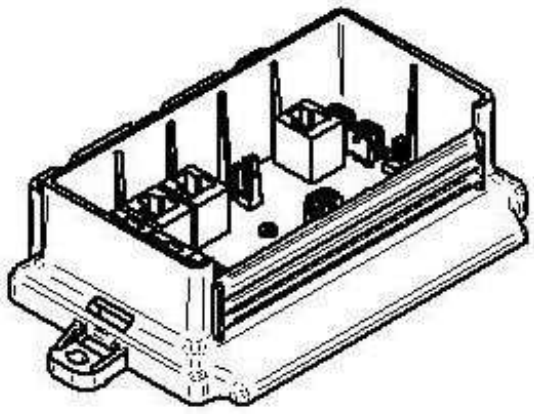
POZ. 2, 3
1 -
2 - Go
3 -
4 - Lat R
5 -
6 - Lat L

POZ. 4, 5
1 -
2 - Examination position
3 -
4 - Hight down
5 -
6 - Hight up

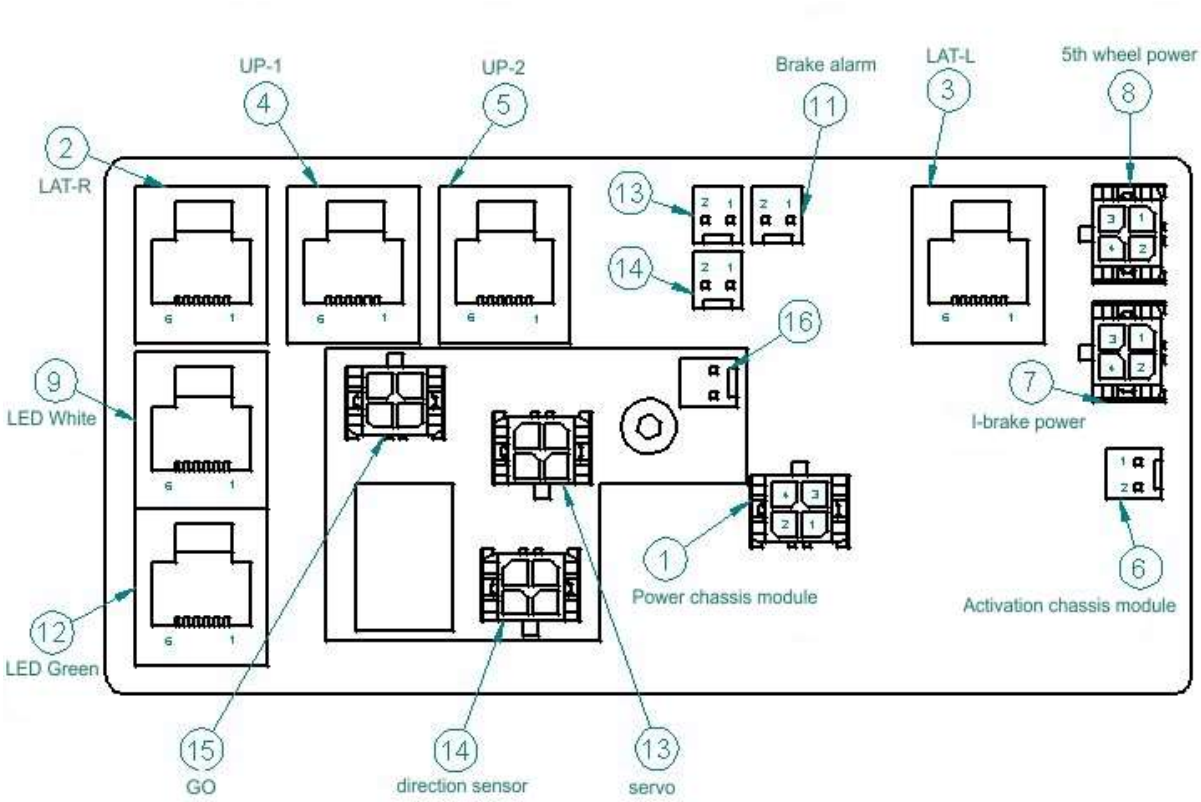
POZ. 9, 12
1 -
2 - (+) Led anode
3 -
4 -
5 - (-) Led cathode
6 -

POZ. 6, 11
1 -
2 -

POZ. 1, 7, 8
1 - (+)
2 - RD
3 - GND
4 - TXD



4.9 Undercarriage module (version with 5th castor)



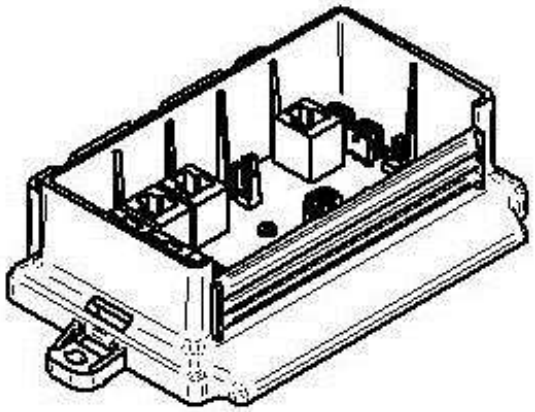
POZ. 2, 3
1 -
2 - Go
3 -
4 - Lat R
5 -
6 - Lat L

POZ. 4, 5
1 -
2 -Examination position
3 -
4 -Hight down
5 -
6 -Hight up

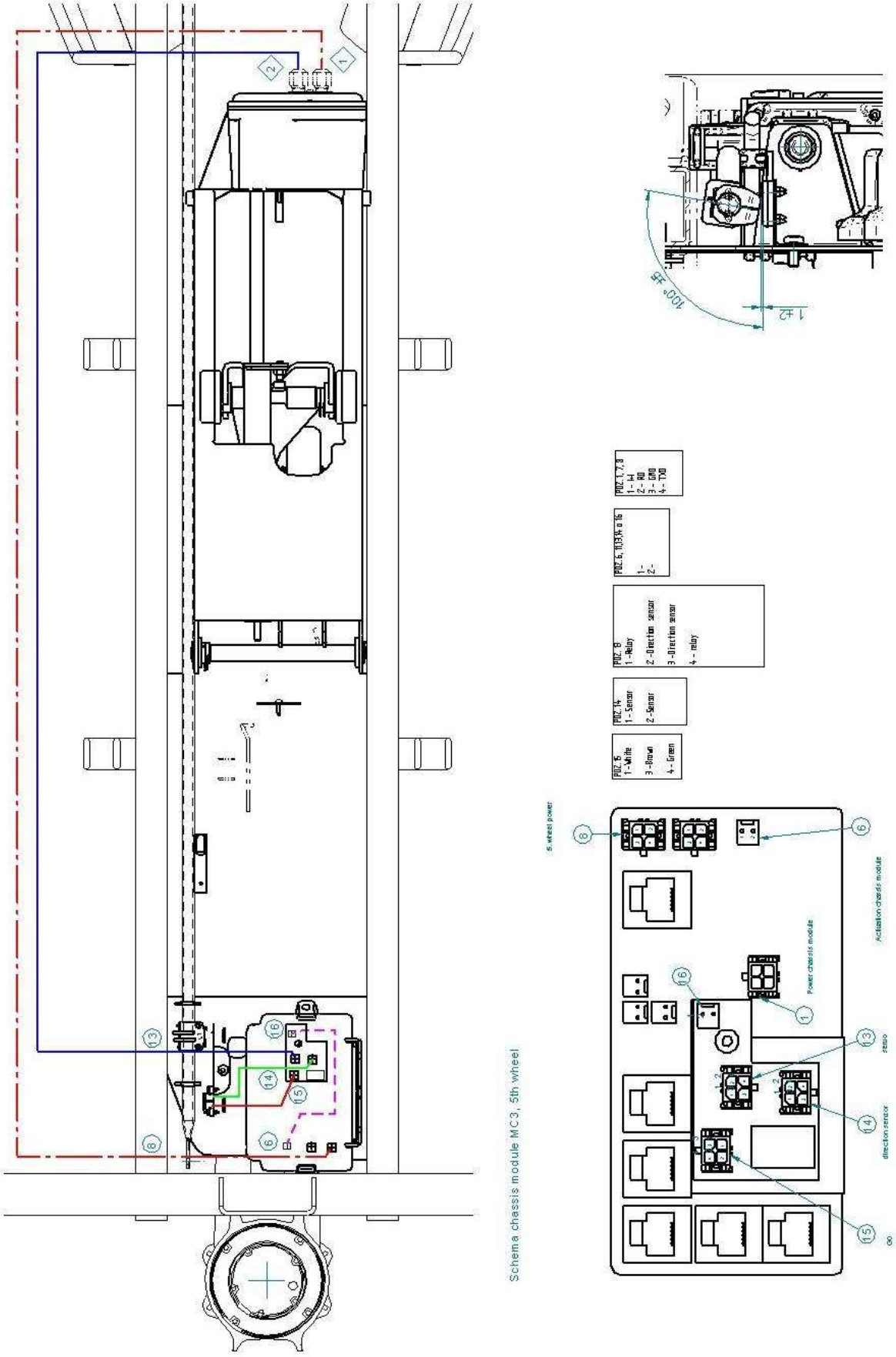
POZ. 9, 12
1 -
2 -(+) Led anode
3 -
4 -
5 - (-) Led cathode
6 -

POZ. 6, 11
1 -
2 -

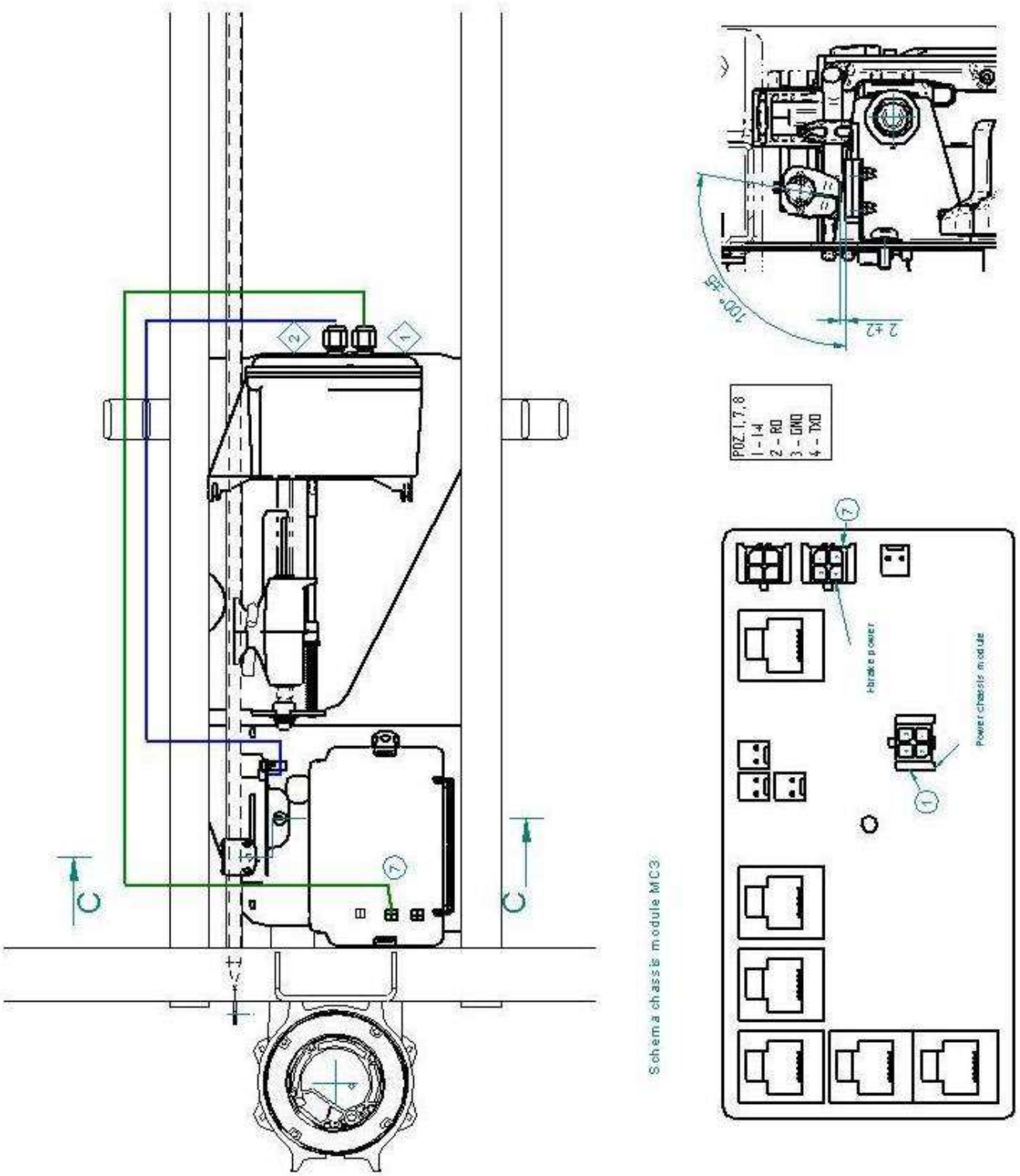
POZ. 1, 7, 8
1 - (+)
2 - RO
3 - GND
4 - TXO



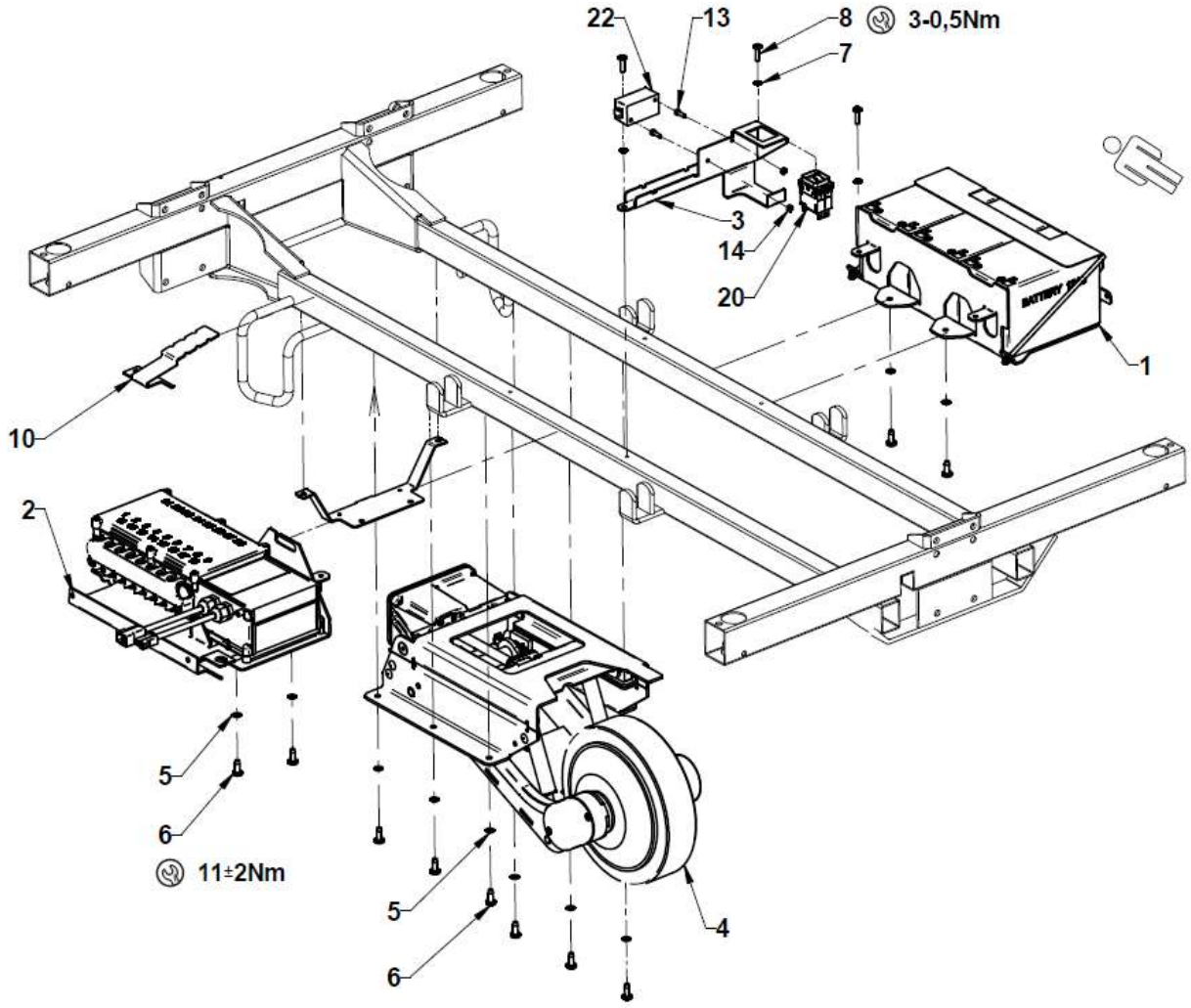
4.10 5th castor



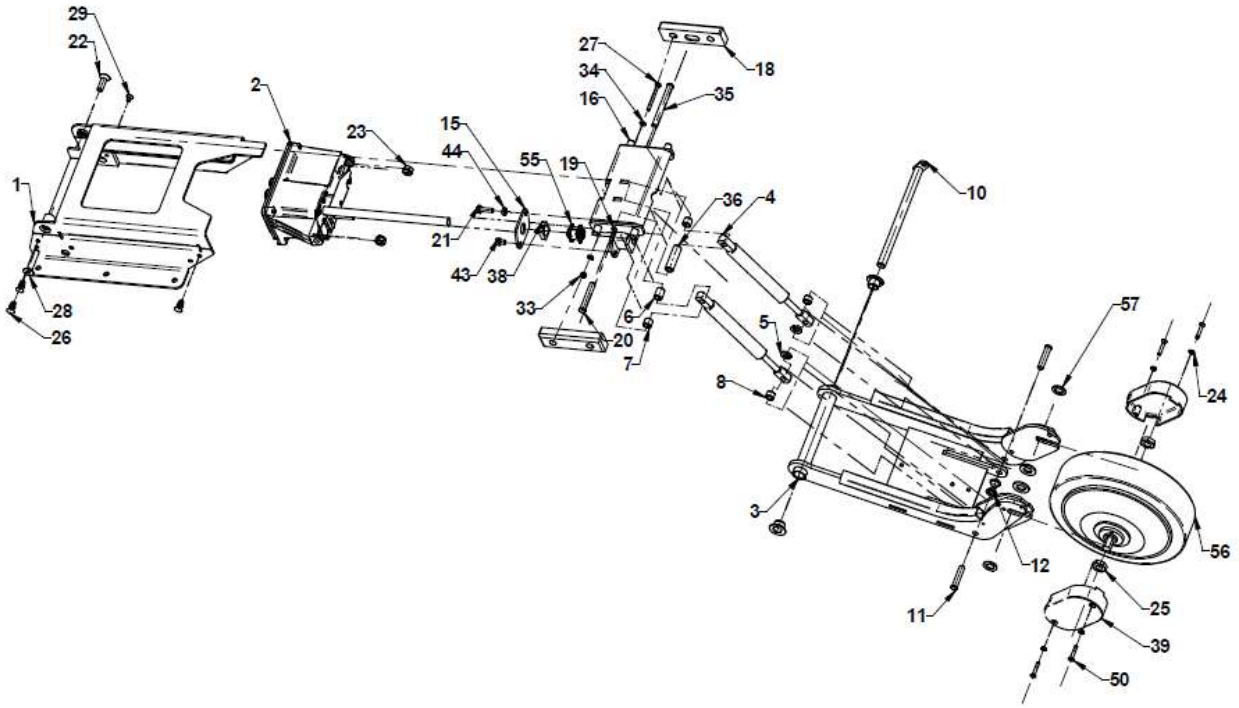
4.11 I-brake


POZ.1,7,8
1 - 14
2 - RD
3 - GND
4 - TXD
brake power
Power chassis module
Schema chassis module MC3

4.12 I-Drive Power wheel



POSITION	PART NAME	PCS
1	AKU Assembled	1
2	i-Drive control box	1
3	Cable ribbon	1
4	Drive wheel assembly	1
5	Fan-shaped washer 6,4 DIN 6798A – steel/zinc	10
6	Tapping screw M6x16 VALCOC Torx 30 DIN7500-C	10
7	Toothed washer steel Zn 5,3/10/0,6 DIN6797A	3
8	Tapping screw M5x18 VALCOC Torx 25 DIN7500-C	3
10	Cable clip	1
13	Connecting screw M4x12 IMB DIN912	2
14	Selflocking nut M4 DIN985	2
20	Battery disconnecter Schurter	1
22	*	



POSITION	PART NAME	PCS
1	Frame of drive wheel	1
2	iDrive drive	1
3	iDrive welded arm	1
4	Gas spring	2
5	Distance washer plastic 8,4/16/1,6	2
6	Distance busher 8x12x15	1
7	Distance busher 8x12x5	2
8	Distance busher 8x12x8	2
10	Wheel cog	1
11	Bottom gas spring cog	2
12	Starlock deep 8	2
15	Flange nut	1
16	Support of gas spring compression	1
18	Guiding element	2
19	Nut holder	1
20	Upper gas spring cog	1
21	Hex screw M6x20 DIN933	1
22	Embedded screw M8x25 IMB DIN7991	1
23	Selflocking nut M8 DIN985	2
24	Fan-shaped washer conic Fe/Zn/Cr	4
25	Nut M12 DIN439	2
26	Stopping fastener	3
27	Hex screw M6x50 DIN933	1
28	Embedded screw M8x40 IMB DIN7991	1
29	Embedded screw M5x8 IMB DIN7991	1

33	Selflocking nut M4 DIN985	1
34	Distance washer 4,3 DIN125A	2
35	Upper gas spring cog – long	1
36	Distance bushing 8x12x41	1
38	Distance washer S235JRG2 (235MPa)	1
39	Wheel shelter	2
43	Cylindric screw imbus M6x8 IMB DIN912, 8.8, EsLock	1
44	Nut M6 DIN439	1
50	Screw	4
55	*	1
56	Wheel	1
57	Toothed washer	2

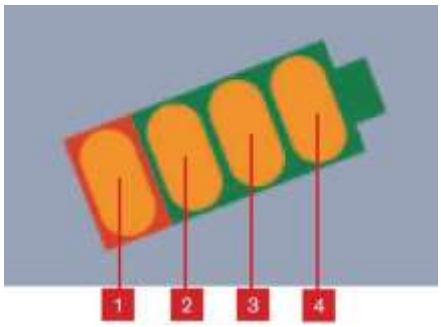
4.12.1 Fault signalisation

The system is protected against failure states by stopping and braking the drive system and then signalising the type of failure. The fault is indicated by brief flashes and the battery indicator shows the fault state. Some of the defects can be cleared automatically (eg: drive overheating).

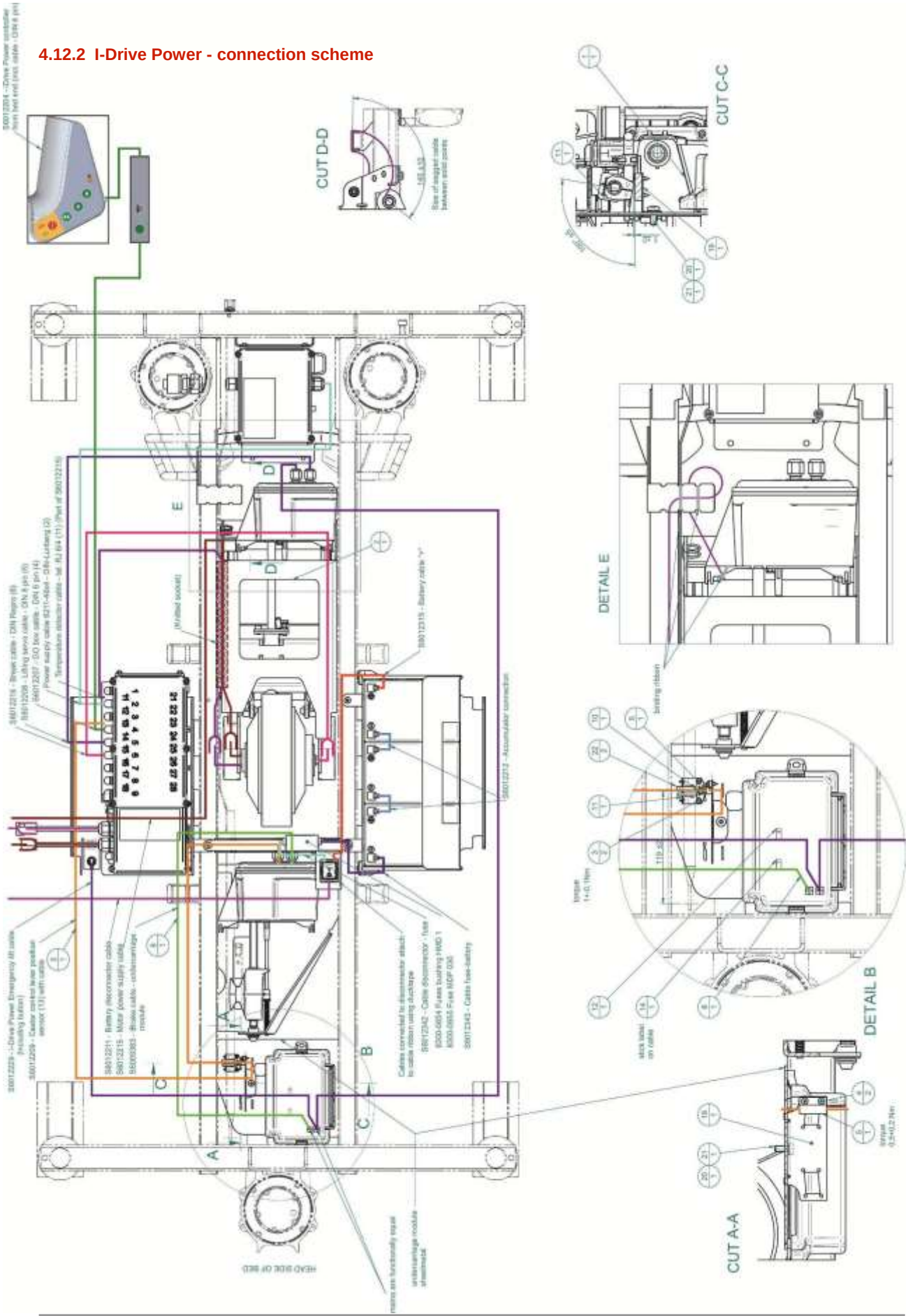
Error	LED1	LED2	LED3	LED4
Drive overheated*	Off	Off	Off	On
Electronics overheated*	Off	Off	On	Off
Brake error	Off	Off	On	On
Retraction not completed	Off	On	Off	Off
5V off limits	Off	On	Off	On
FET closing penetrated	Off	On	On	Off
Control circuit overheated	Off	On	On	On
Control circuit error	On	Off	Off	Off
Activation button stuck	On	Off	Off	On
Retraction button stuck	On	Off	On	Off
Active button after start	On	Off	On	On

**An acoustic signal occurs before the drive is blocked (short acoustic signalisation)*
NOTE *the LED indicators are numbered from the left.*

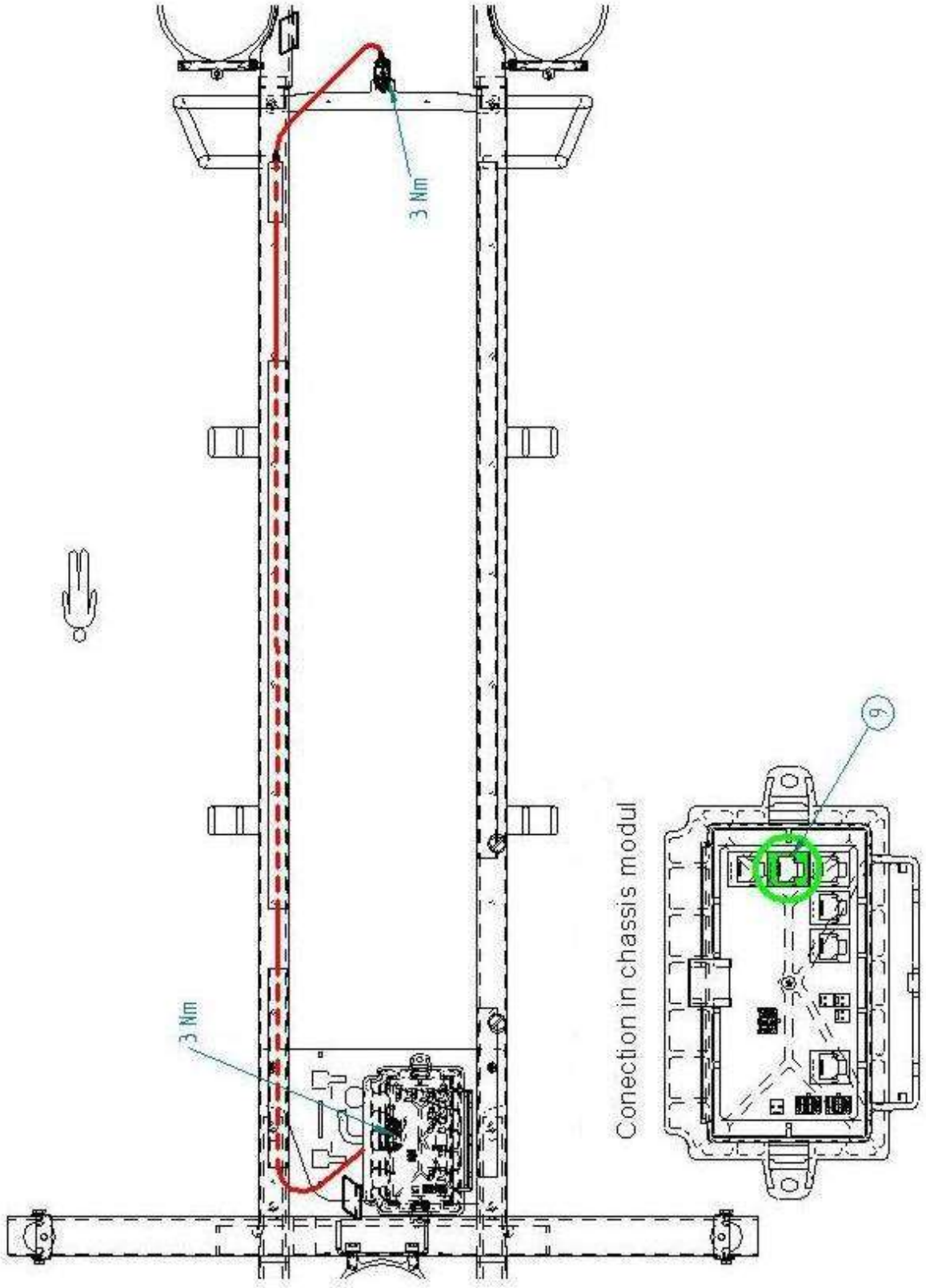
Fig. 01 *Battery LEDs*



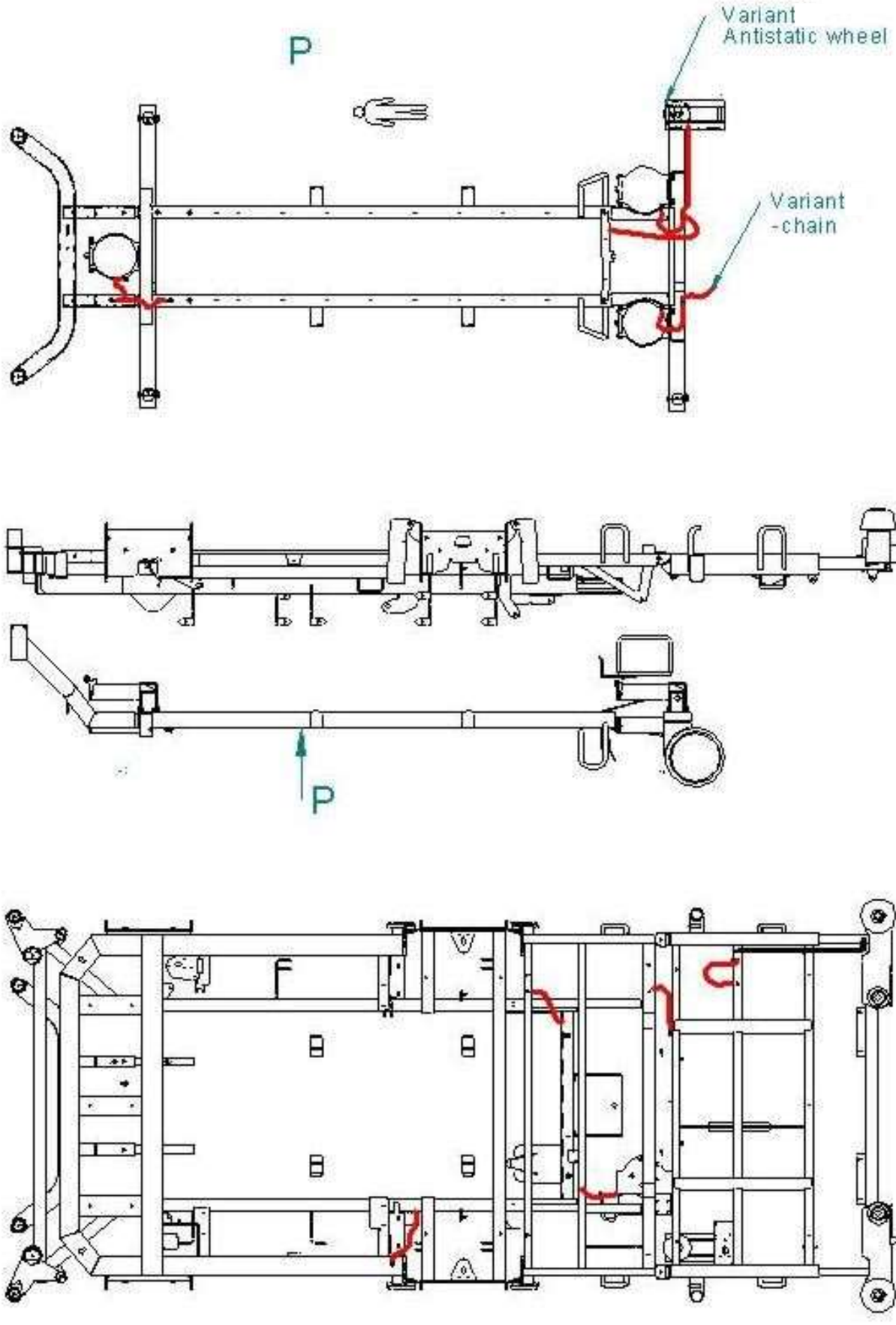
4.12.2 I-Drive Power - connection scheme



4.13 Night light



4.14 Equipotential bonding connections



5 Bed setup

5.1 Faulty Multiboard

If one LCD panel is faulty:

- The LCD panel will go blank.

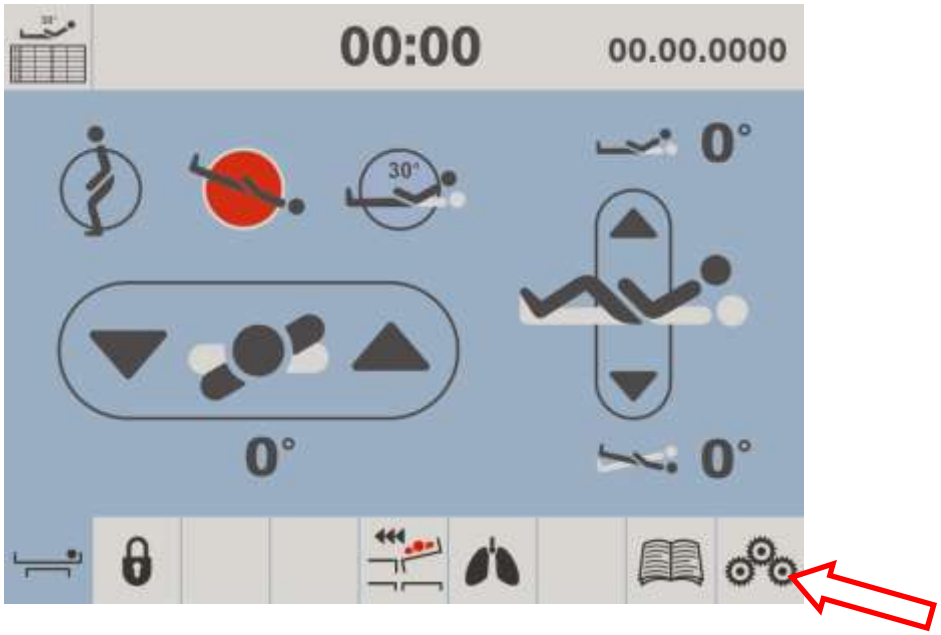
If both LCD panels are faulty:

- Both LCD panels will go blank.
- An alarm will sound. (If the bed is on battery power, the alarm will sound for approximately 1 minute and will then turn off. Signalisation starts again if the GO button is pressed).
- Should this occur, it is possible to position the bed for only 5 seconds after pressing the GO button and then the GO button must be pressed again in order to position the bed for the next 5 seconds.

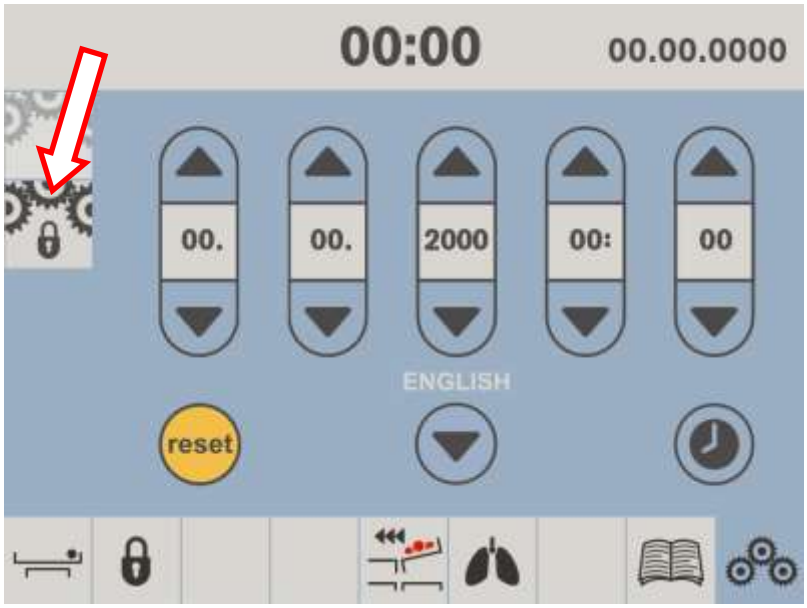
5.2 Switching compatible mode on the Multiboard

If the new version of Multiboard (SW for mattress) is to be fitted on a bed which has the older version of Multiboard (SW without mattress), it is necessary to switch the new Multiboard to the compatible mode. The wrong combination (old power box + new Multiboard) is indicated by the date and time being shown as zero and the time not running.

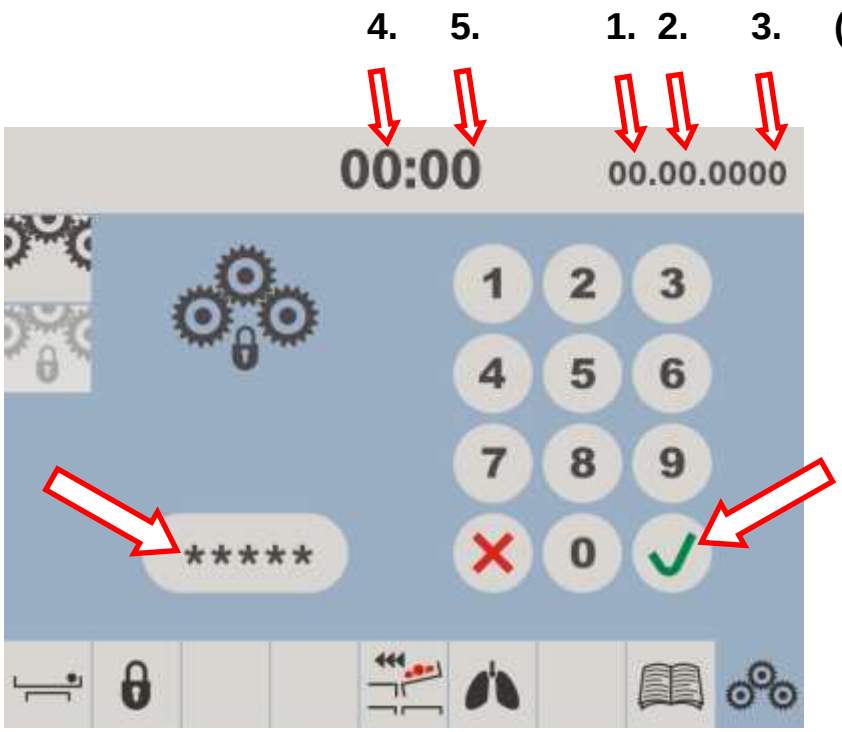
- Press the „settings“ button on the Multiboard panel which is located on the head siderails.



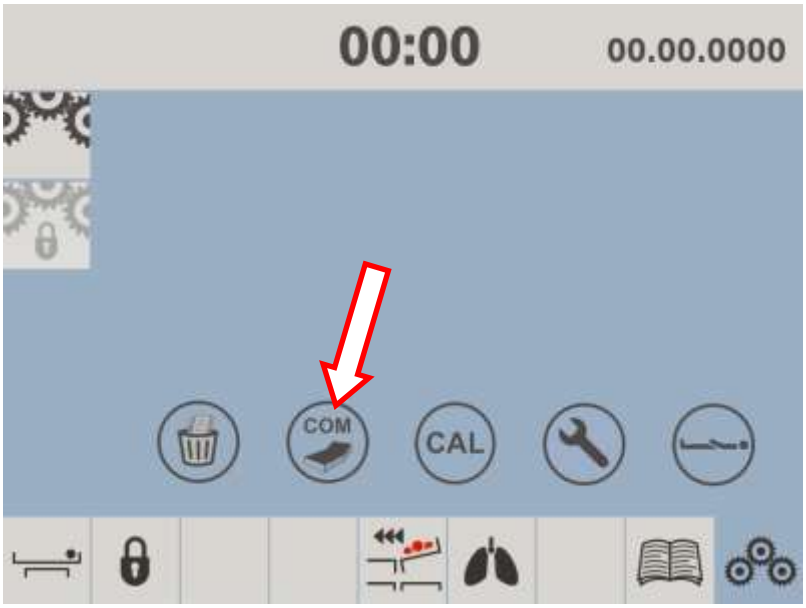
- Switch to the service mode.



- Log in to the service mode by entering the log-in code.
- Enter the 5-digit code which is composed of the last numbers of the date and time. In this case 00000.
- Press the green enter button.



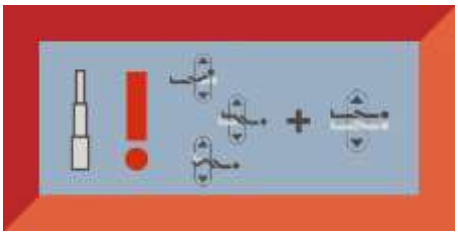
- Press the „COM“ button for switching to compatible mode. The „COM“ icon will be shown as crossed out.



5.3 Positioning with a single column

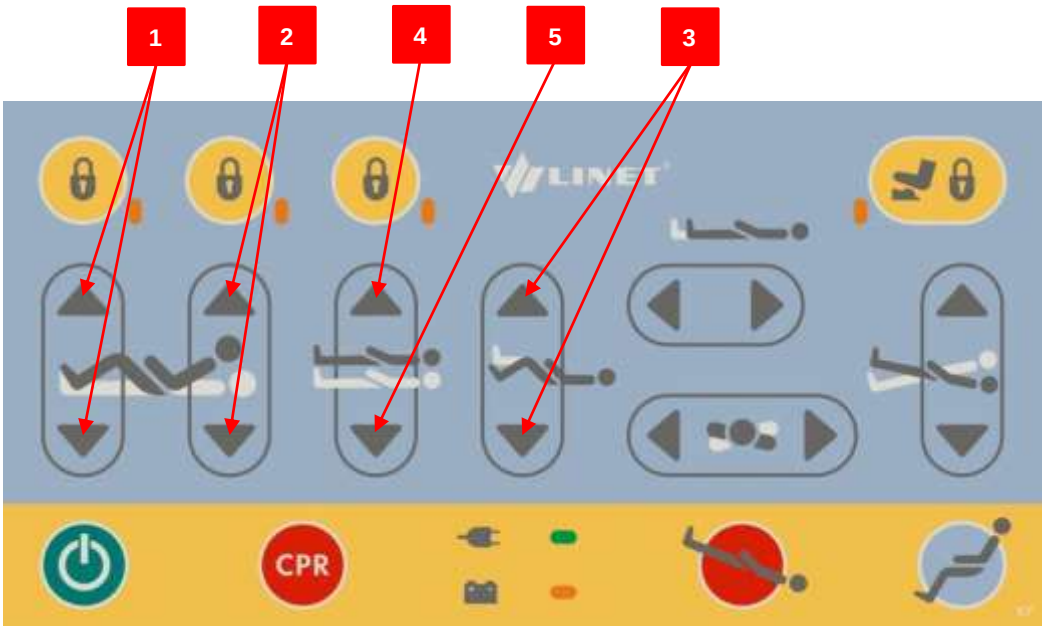
When a column becomes defective, it is possible to move a single column for easier replacement.
To move a single column, it is necessary for the potentiometer circuit to be broken. A defective potentiometer will put the bed into positioning mode or if the potentiometer isn’t defective, it is possible to disconnect one column to put the bed into positioning mode.

Column movement:
1. Press and hold the respective buttons (see below).
2. Position the column up or down using the height adjustment buttons.



Moving a single column:

- To move the right foot column up, disconnect either the left foot or head column. Press and hold the calftrest button (3) then press the patient surface up button (4).
- To move the right foot column down, disconnect either the left foot or head column. Press and hold the calftrest button (3) then press the patient surface down button (5).
- To move the left foot column up, disconnect either the right foot or head column. Press and hold the thighrest button (1) then press the patient surface up button (4).
- To move the left foot column down, disconnect either the right foot or head column. Press and hold the thightrest button (1) then press the patient surface down button (5).
- To move the head column up, disconnect either the right foot or left foot column. Press and hold the backrest button (2) then press the patient surface up button (4).
- To move the head column down, disconnect either the right foot or left foot column. Press and hold the backrest button (2) then press the patient surface down button (5).



5.4 Column and accelerometer calibration

After replacing always calibrate:

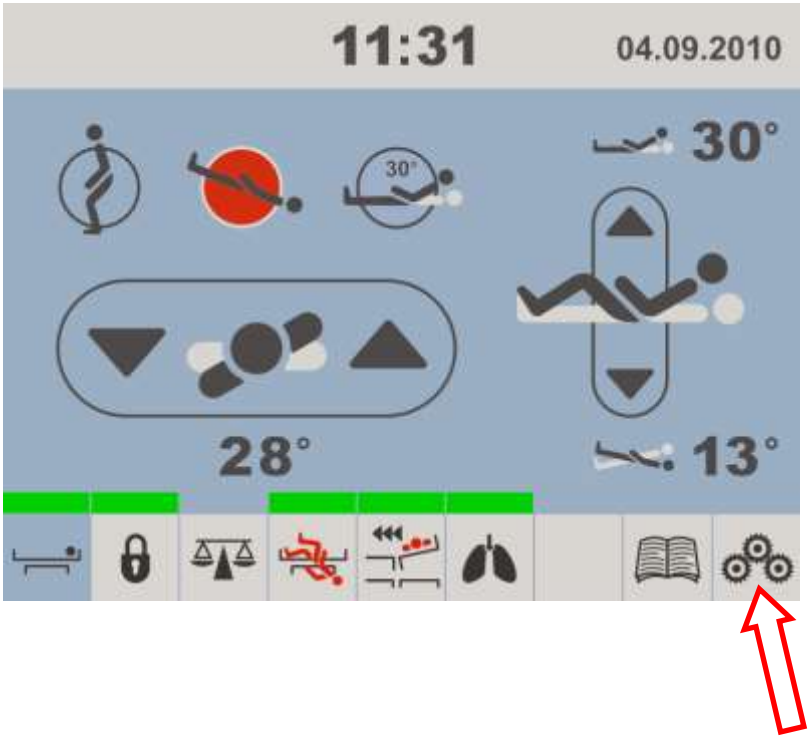
a) Any column.
b) Control box.
c) Any accelerometer.

Calibration of columns means:
Calibrating the speed of the columns during up or down movement.
Calibration of accelerometers means:
Calibrating the mattress platform, backrest and calfrest accelerometers in the horizontal position.

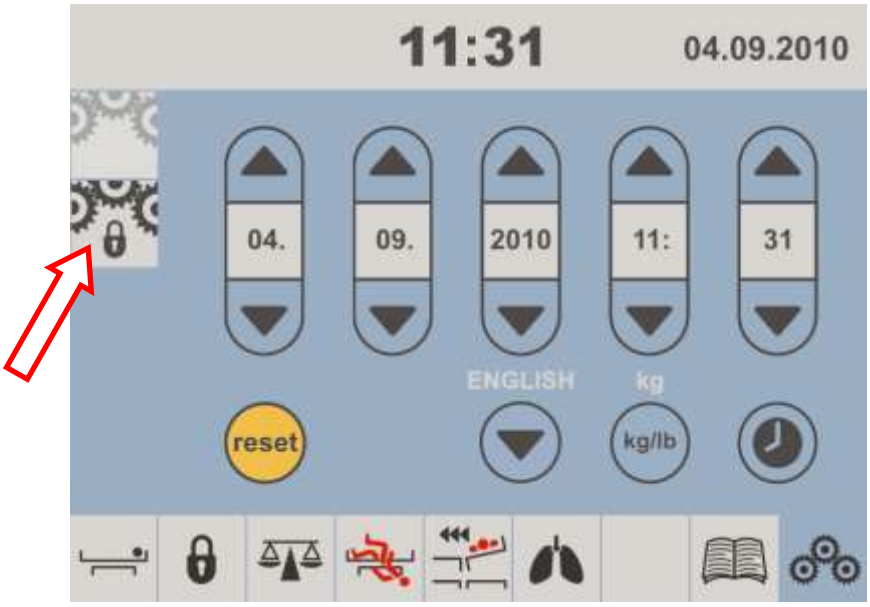
Connect the bed to the mains and activation the GO button.

5.4.1 Column and accelerometer calibration using the LCD Multiboard panel

- Press the „settings“ button on the Multiboard panel which is located on the head siderails.



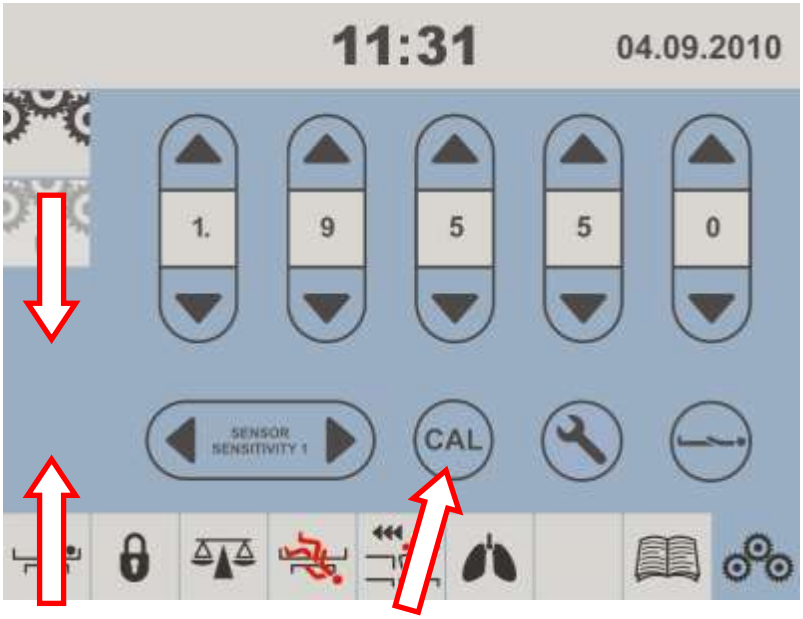
- Switch to the service mode.



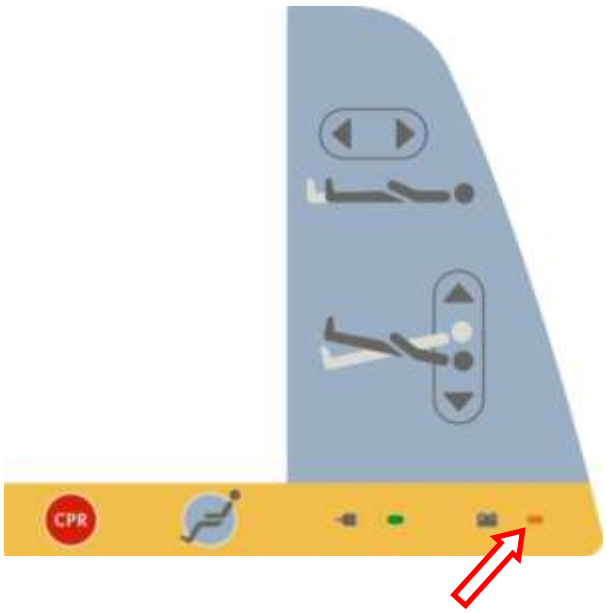
- Log in to the service mode by entering the log-in code.
- Enter the 5-digit code which is composed of the last numbers of the date and time.
- Press the green enter button.

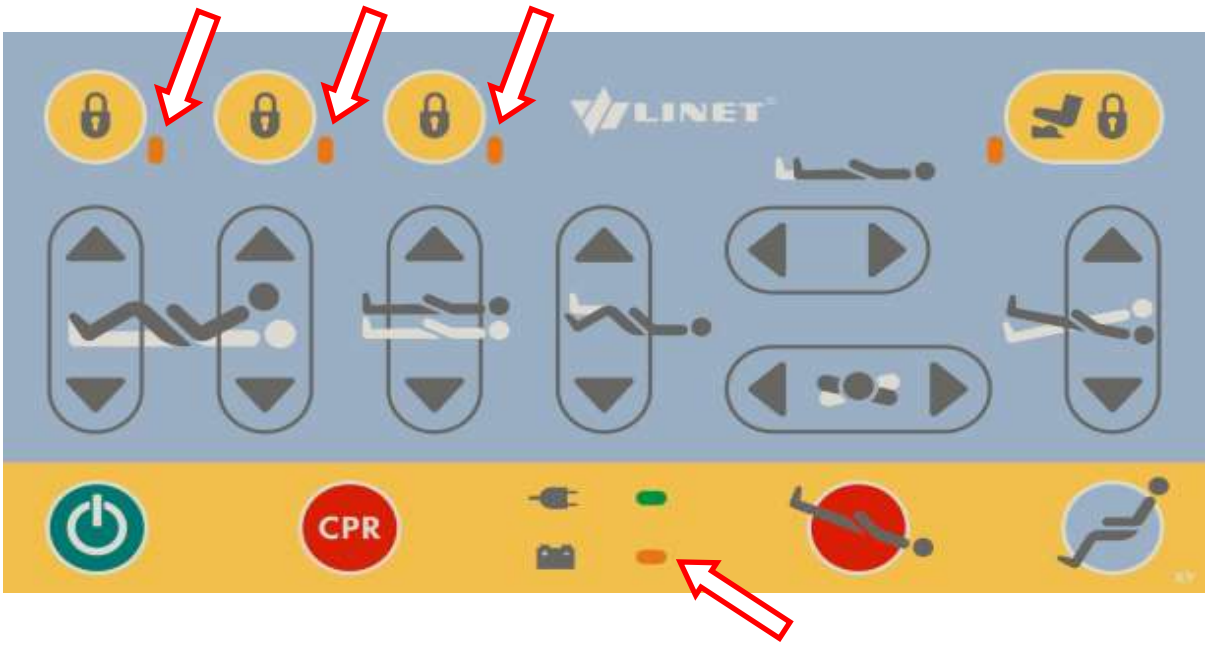
4. 5. 1. 2. 3. (example 49011)

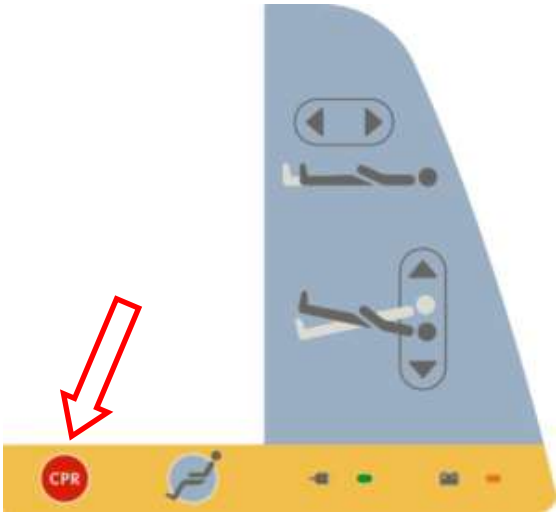
- Press the button for setting the calibration of the columns and accelerometers.
- Hold the button for at least 5 seconds until the count down bar disappears and a sound signal occurs.



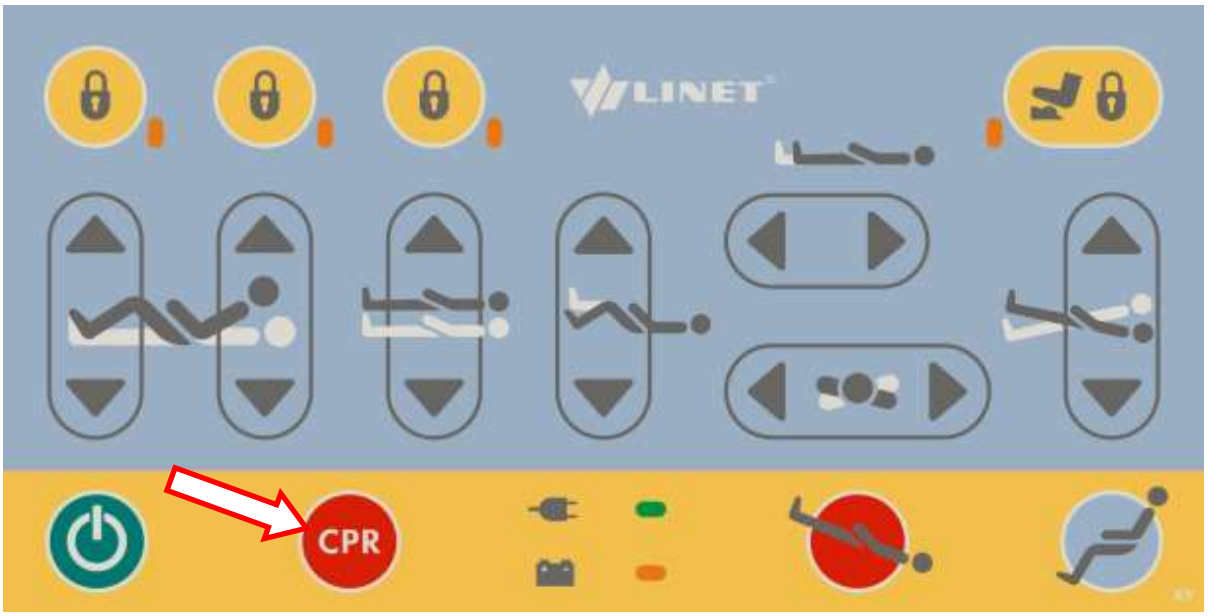
- Check whether you are in calibration mode. The lock functions and battery LEDs should be flashing on the ACP control panel as well as the battery LED on the Multiboard panel and the lock function LEDs on the hand control.
- This mode is only active for 1 minute. Start the calibration process now.







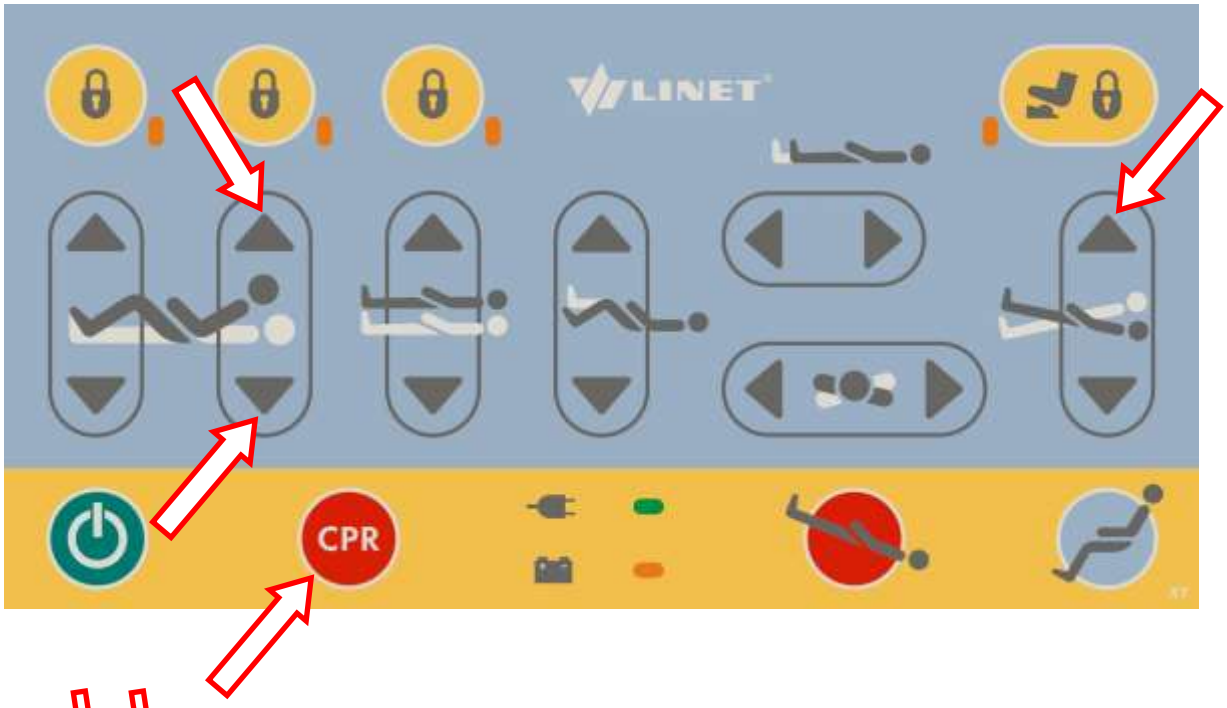
- To calibrate the columns and accelerometers, press and hold the CPR button until 3 cycles have completed. This is possible from all control panels.
- The bed will go into the lowest position and the mattress platform parts will become horizontal.
- After completing each cycle, a short sound signalisation occurs and one lock LED turns off.
- It is necessary to press the CPR button throughout calibration otherwise the whole process must be repeated!
- Once the calibration cycles have completed, a sound signalisation occurs and the lock LEDs turn off. The calibration process is now finished.

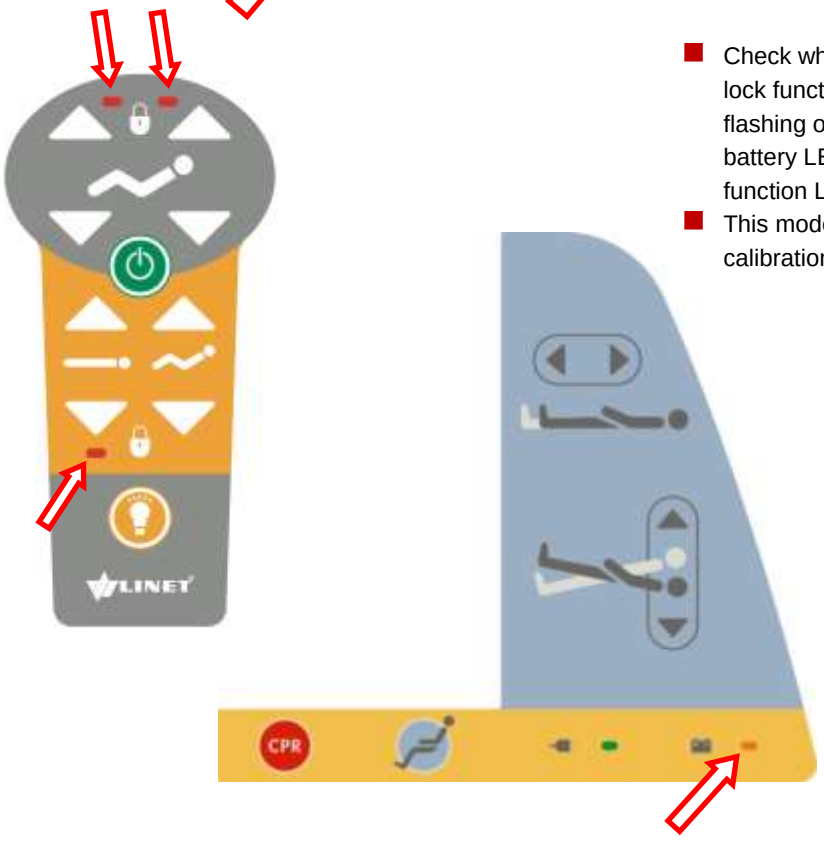


It is recommended to quit service mode using the **STOP** button. Otherwise, service mode deactivates automatically after approximately 3 mins.

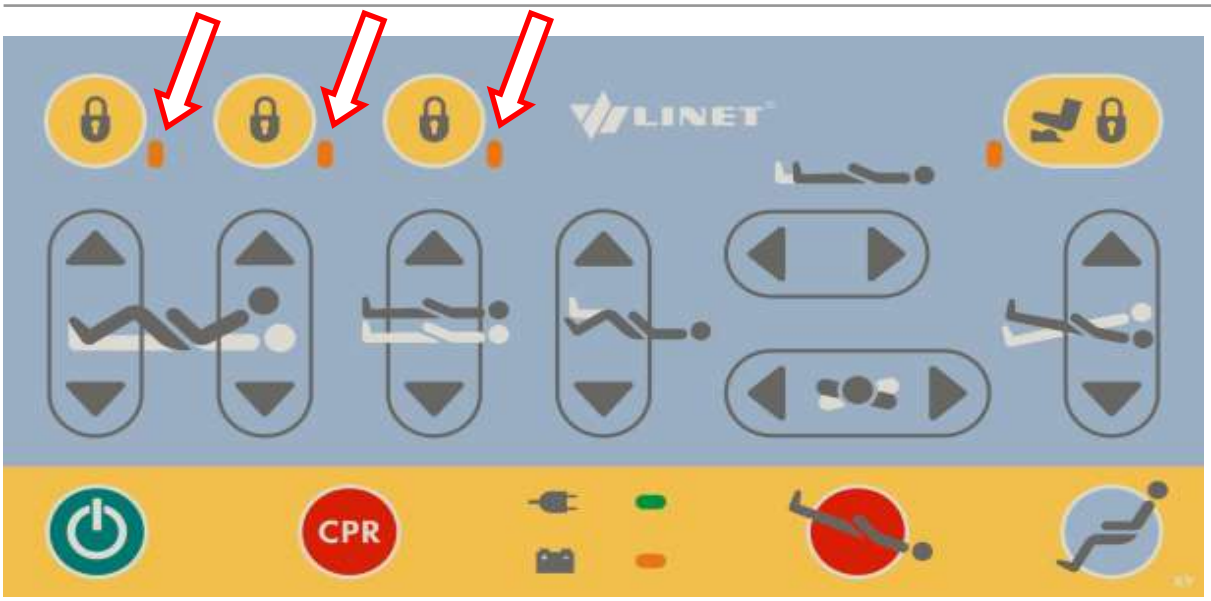
5.4.2 Column and accelerometer calibration using the ACP

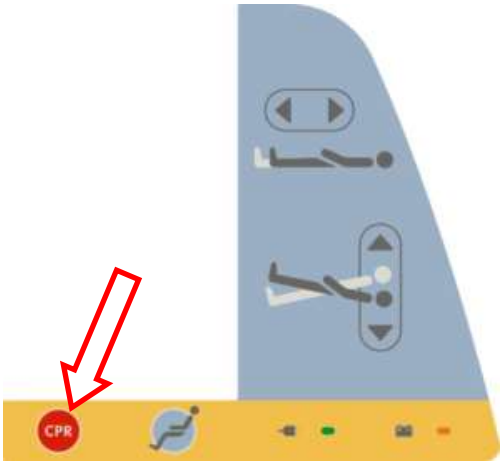
- Enter the service mode by pressing a combination of four buttons on the nurse control panel (ACP).
- Simultaneously press backrest up, backrest down, CPR and anti-Trendelenburg buttons, and hold for 3 seconds.



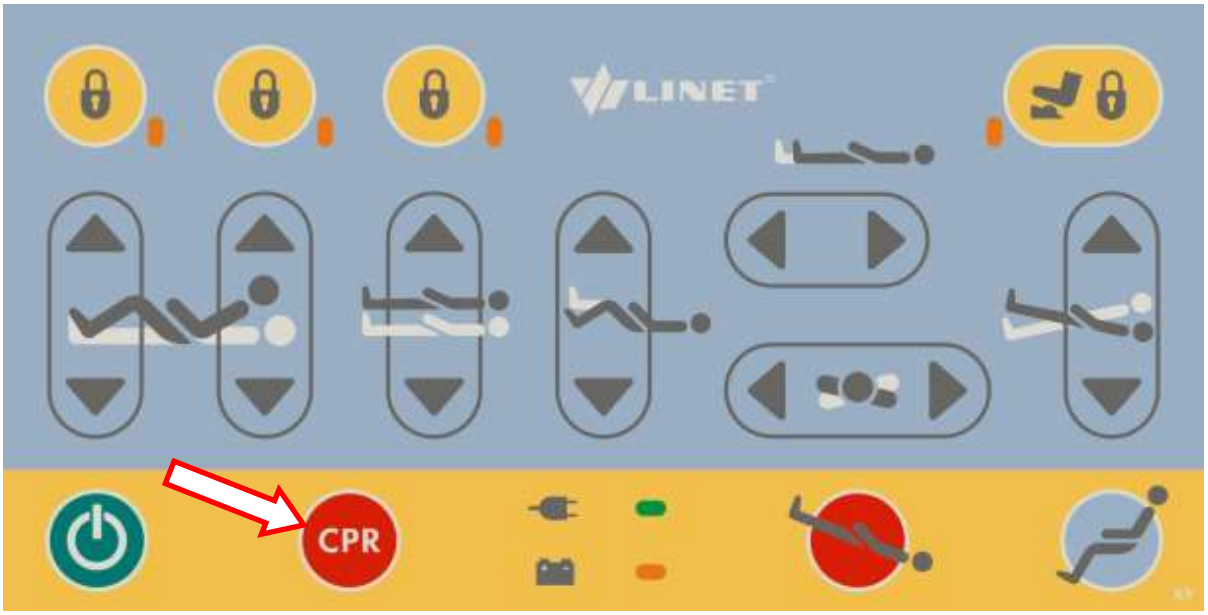


- Check whether you are in calibration mode. The lock functions and battery LEDs should be flashing on the ACP control panel as well as the battery LED on the Multiboard panel and the lock function LEDs on the hand control.
- This mode is only active for 1 minute. Start the calibration process now.





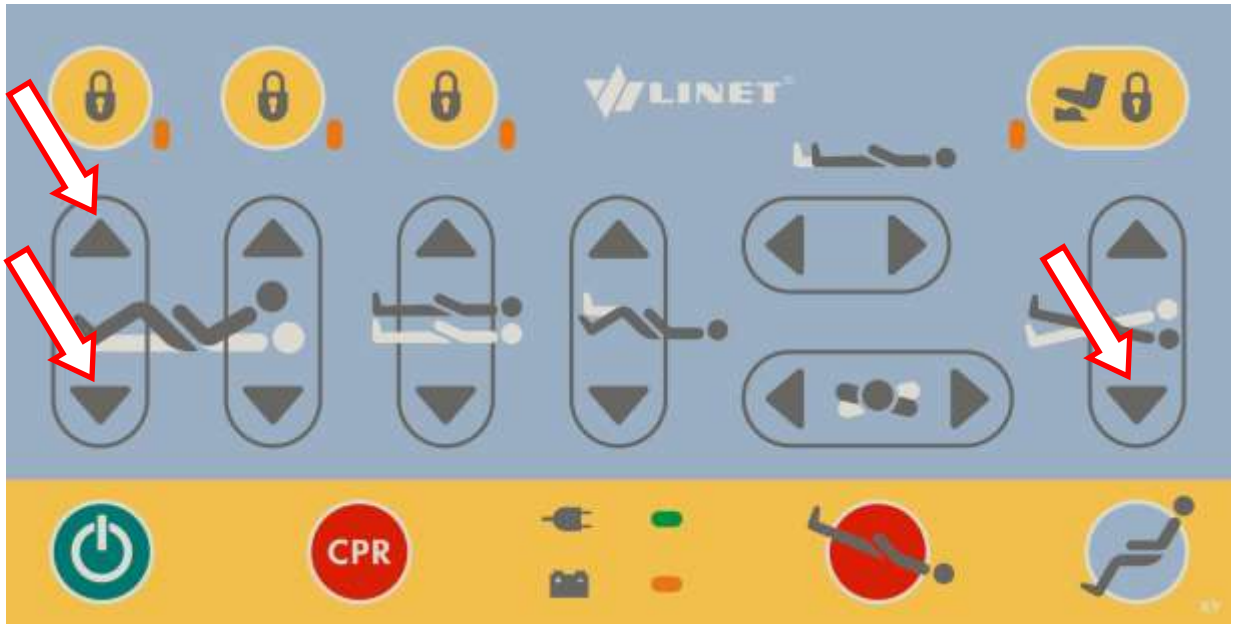
- To calibrate the columns and accelerometers, press and hold the CPR button until 3 cycles have completed. This is possible from all control panels.
- The bed will go into the lowest position and the mattress platform parts will become horizontal.
- After completing each cycle, a short sound signalisation occurs and one lock LED turns off.
- It is necessary to press the CPR button throughout calibration otherwise the whole process must be repeated!
- Once the calibration cycles have completed, a sound signalisation occurs and the lock LEDs turn off. The calibration process is now finished.



It is recommended to quit service mode using the **STOP** button. Otherwise, service mode deactivates automatically after approximately 3 mins.

5.5 Transport lock

- Simultaneously press the calfrest down, calfrest up, and Trendelenburg buttons, and hold them for 3 seconds to activate the transport lock. The bed must be disconnected from the mains.

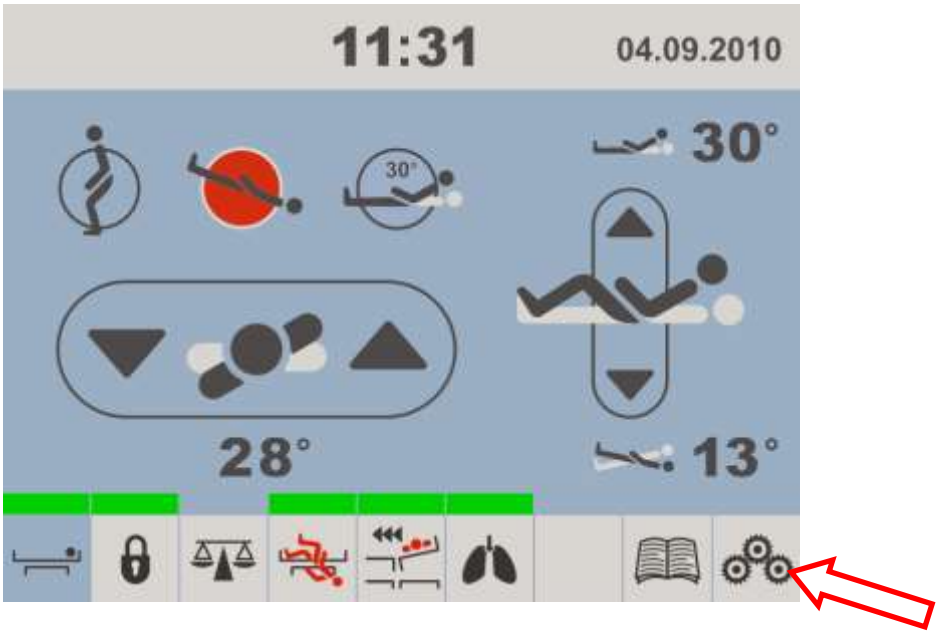


5.6 Switching between new/old accelerometers

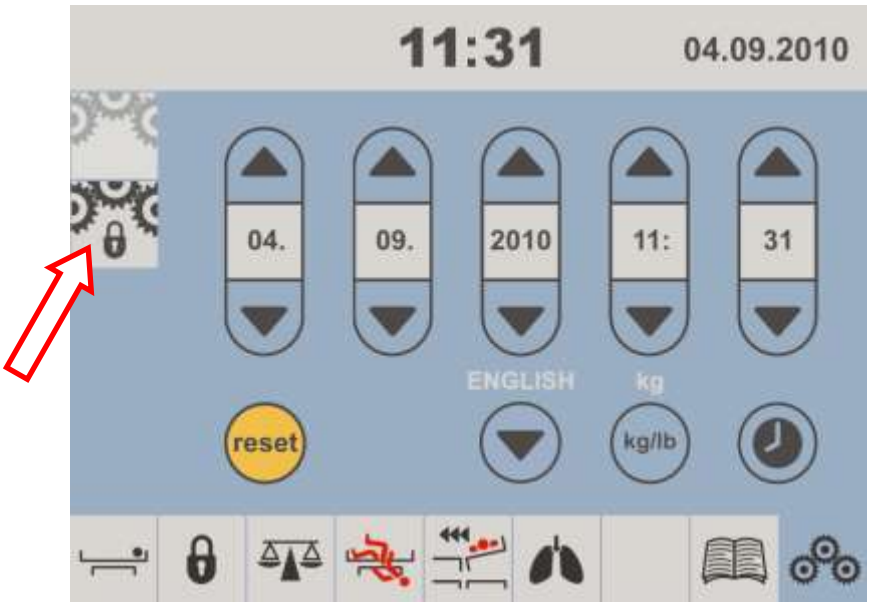
Switching between accelerometers is only neccessary after fitting new accelerometers.
Switching accelerometers can be done on the ACP panel.

5.6.1 Switching accelerometers on the Multiboard panel (PB to version SW 6.11, LCD to version SW 5.10)

- To access the accelerometer switching mode, press the service button.



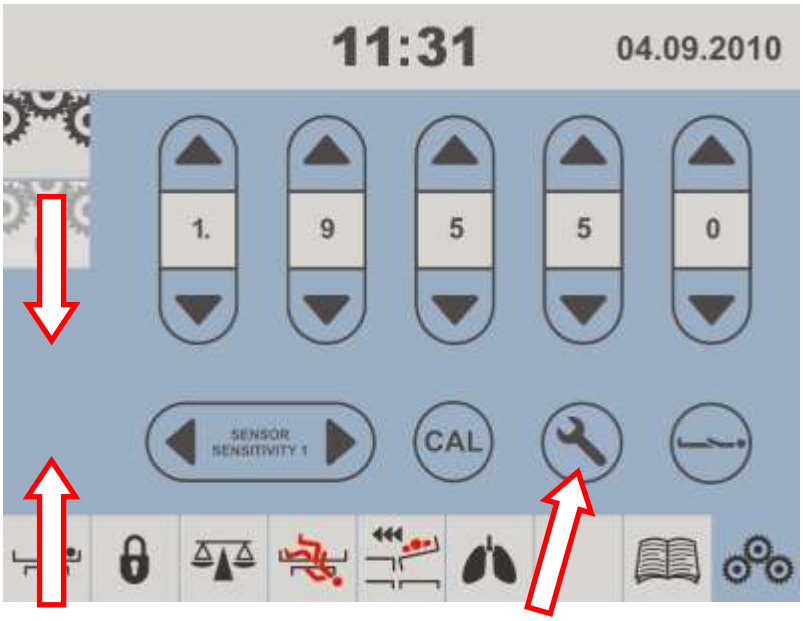
- Switch to the service mode.

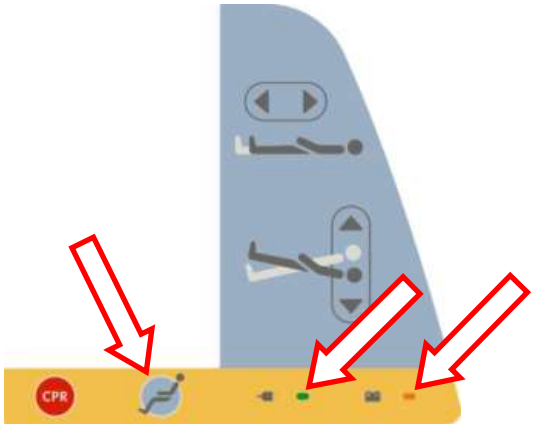


- Log in to the service mode by entering the log-in code.
- Enter the 5-digit code which is composed of the last numbers of the date and time.
- Press the green enter button.

4. 5. 1. 2. 3. (example 49011)

- Press the service mode button
- Hold the button for at least 5 seconds until the count down bar disappears and a sound signal occurs.

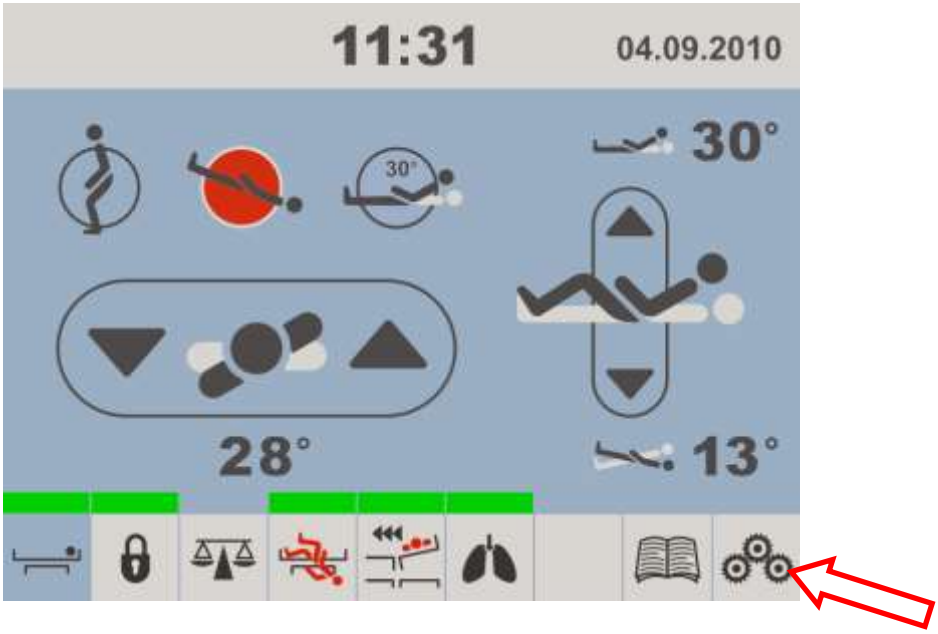




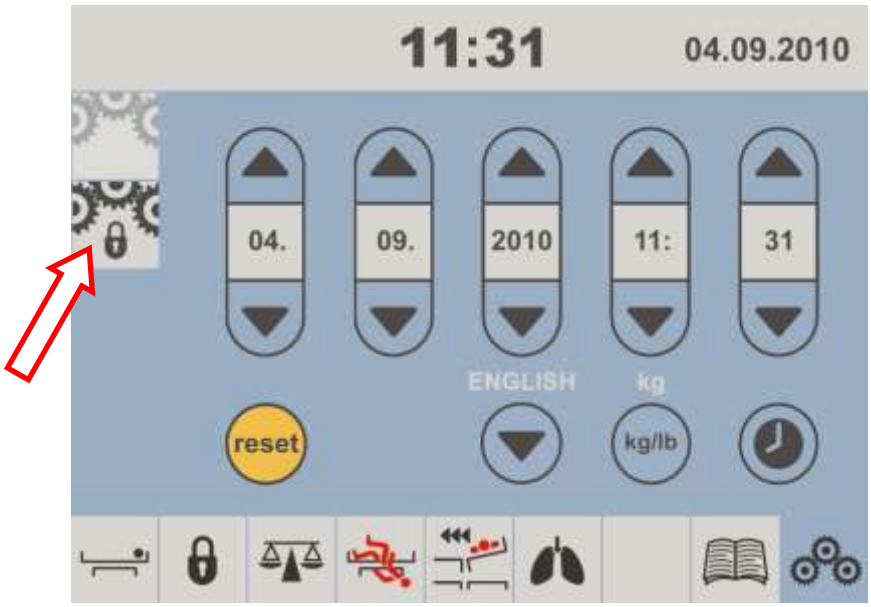
- To confirm that the bed is in service mode, the green LED flashes on the LCD.
- To switch the accelerometers, press the armchair button.
- The green LED indicates changeover to the new type of accelerometer.
- The oranage LED indicates changeover to the old type of accelerometer.
- This mode is active for a duration of 5 mins.

5.6.2 Switching accelerometers on the Multiboard panel (PB from version SW 7.00, LCD from version SW 5.11)

- To access the accelerometer switching mode, press the service button.



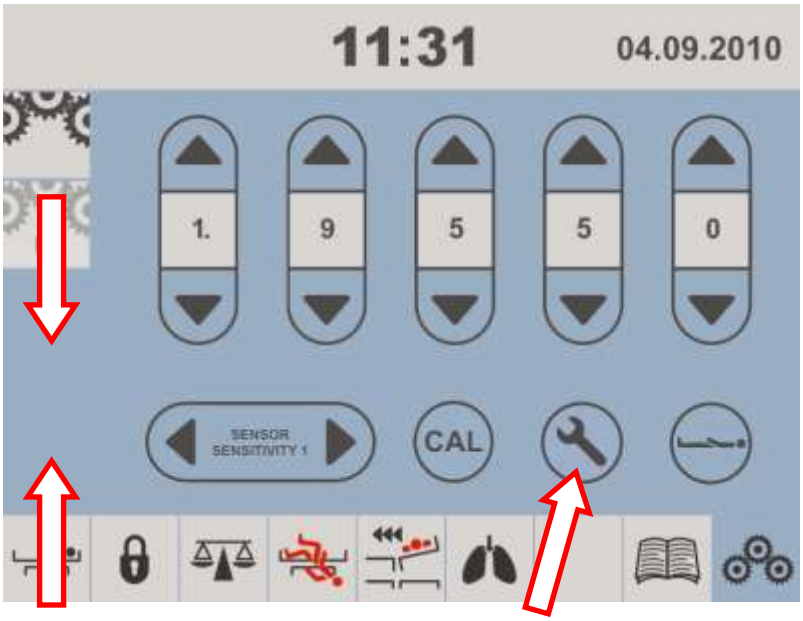
- Switch to the service mode.



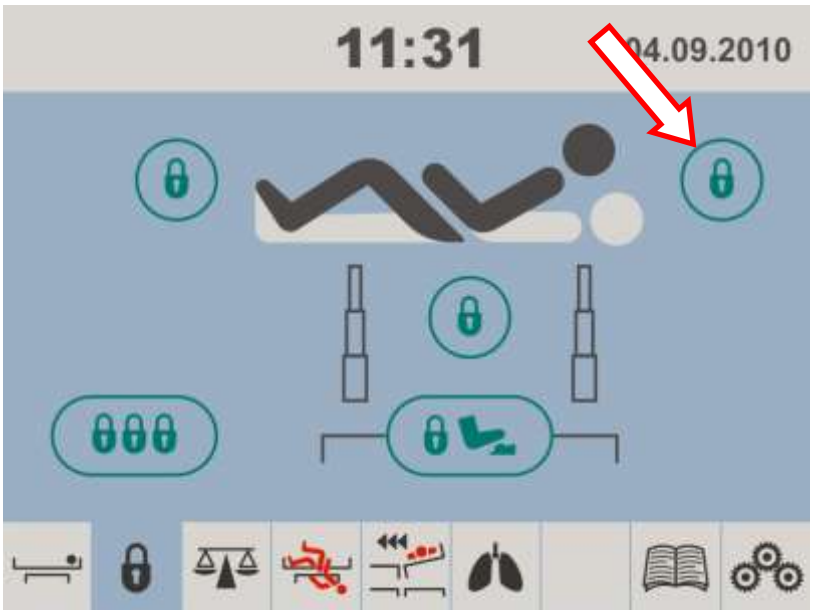
- Log in to the service mode by entering the log-in code.
- Enter the 5-digit code which is composed of the last numbers of the date and time.
- Press the green enter button.

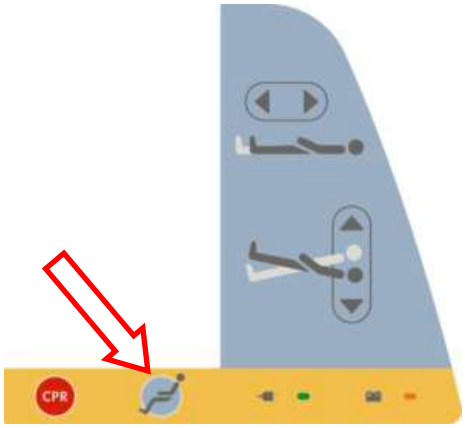
4. 5. 1. 2. 3. (example 49011)

- Press the Press the service mode button
- Hold the button for at least 5 seconds until the count down bar disappears and a sound signal occurs.



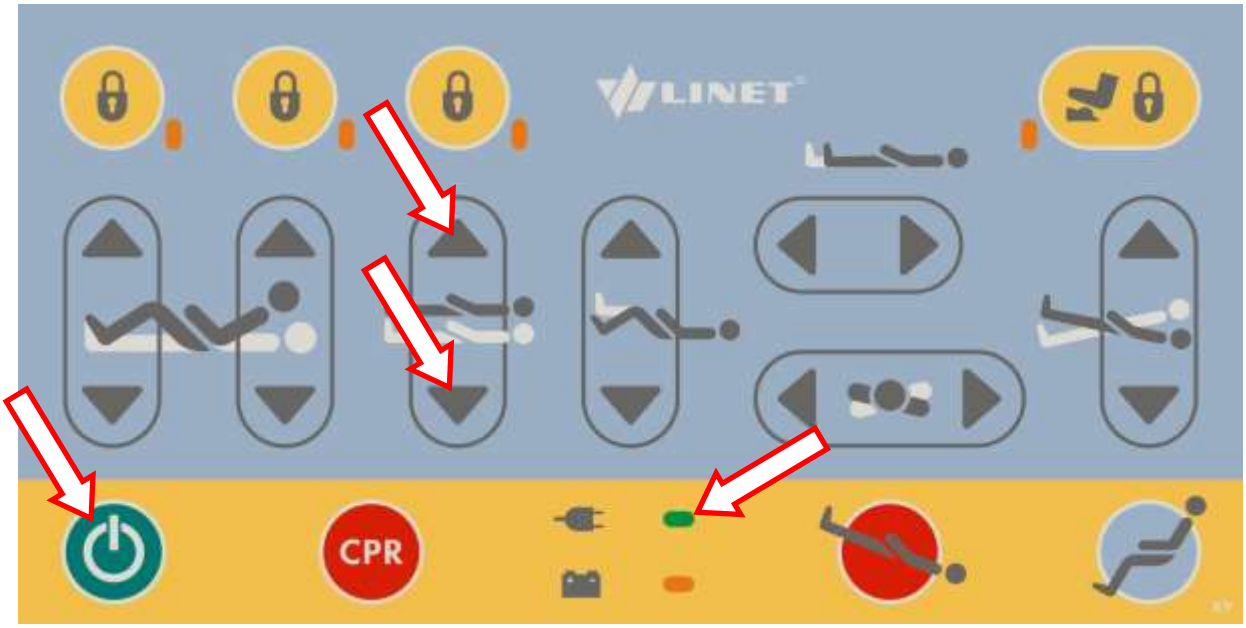
- To confirm that the bed is in service mode, the green LED on the LCD flashes quickly.
- To switch the accelerometers, press the **head-section lock on the L**CD or the **armchair** button.
- Switching on of the **head-section lock** indicates changeover to a new type of accelerometer.
- Switching off of the **head-section lock** indicates changeover to an old type of accelerometer.
- This mode is active for a duration of 5 mins.



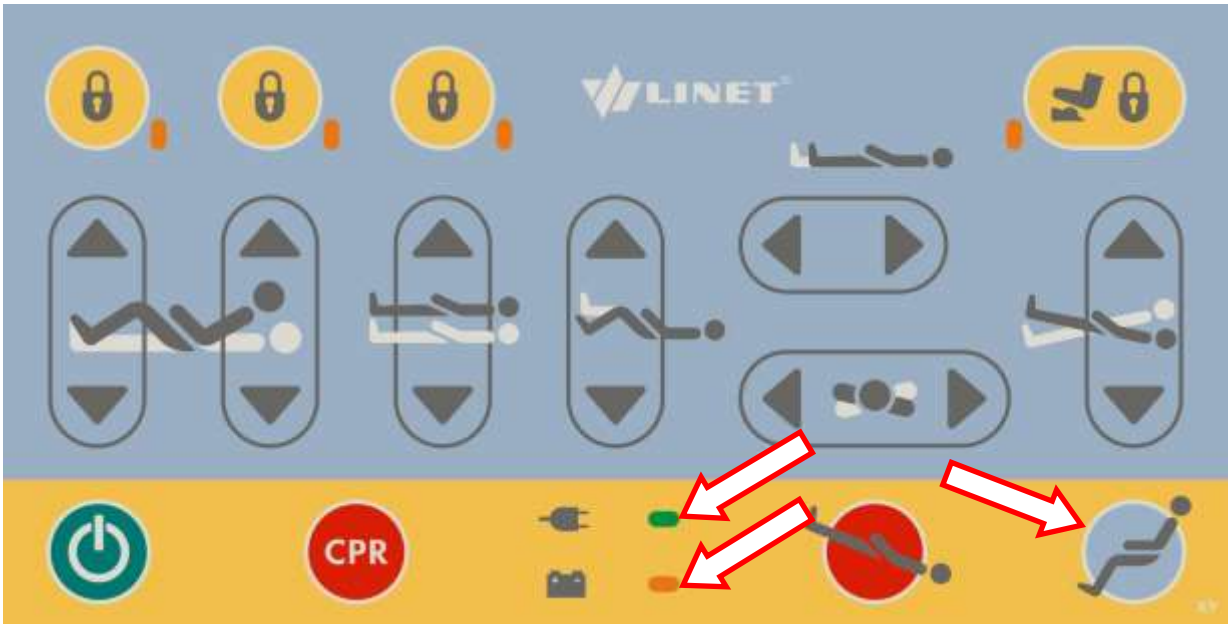


5.6.3 Switching accelerometers on the ACP panel (PB to version SW 6.11, LCD to version SW 5.10)

- To access the accelerometer switching mode on the ACP panel, simultaneously press the patient surface up button, patient surface down button and the GO button for at least 5 seconds. This mode is indicated by the green power LED flashing.

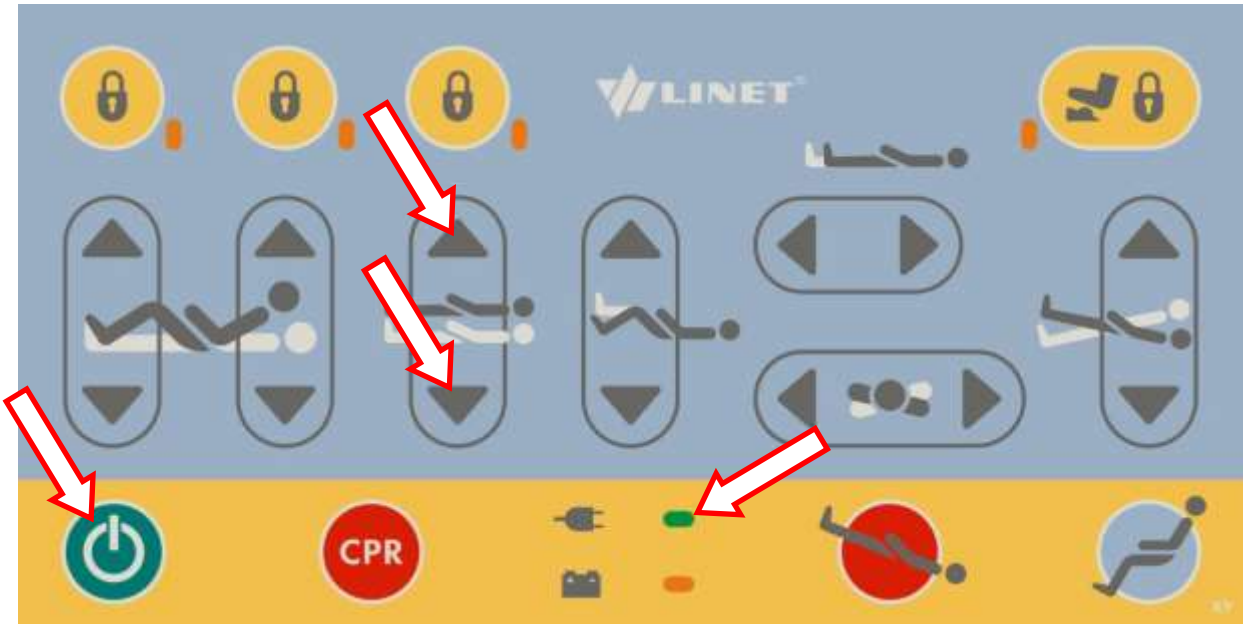


- Switch between accelerometers by pressing the chair button.
- Switching to a new type of accelerometer is indicated by the green LED.
- Switching to an old type of accelerometer is indicated by the orange LED.

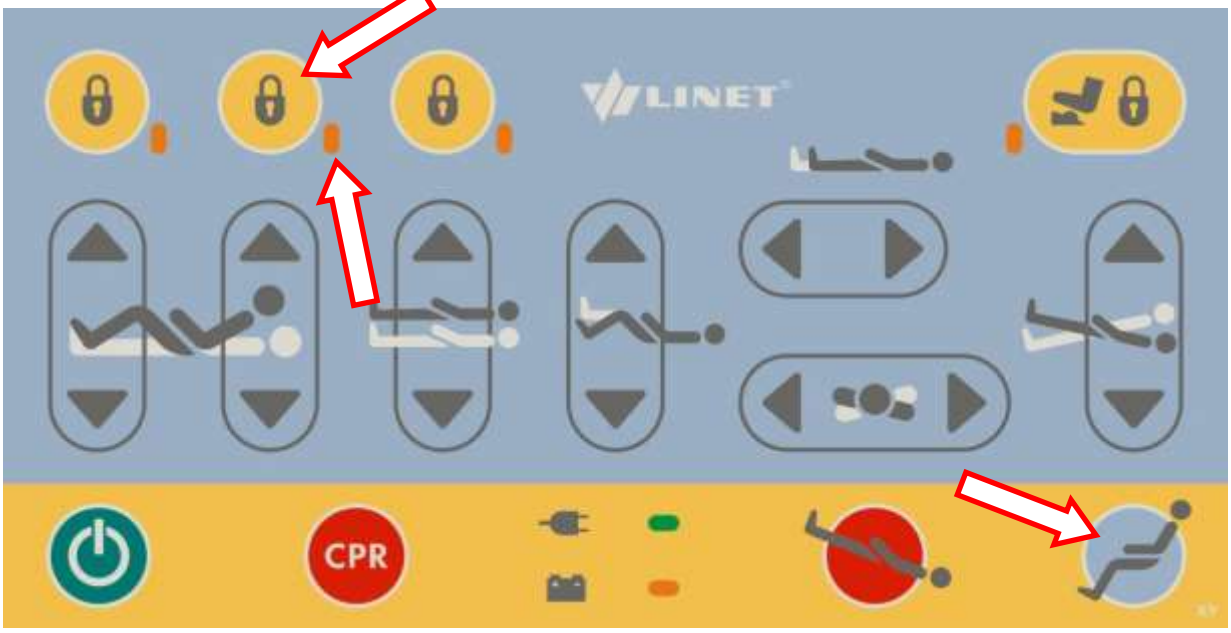


5.6.4 Switching accelerometers on the ACP panel (PB from version SW 7.00, LCD from version SW 5.11)

- To access the accelerometer switching mode on the ACP panel, simultaneously press the patient surface up button, patient surface down button and the GO button for at least 5 seconds. This mode is indicated by the green power LED flashing.



- Switch between the accelerometers by pressing the chair button or backrest lock button.
- Switching to a new type of accelerometer is indicated when the backrest lock LED is off.
- Switching to an old type of accelerometer is indicated when the backrest lock LED is on.



5.7 RC circuit

5.7.1 Function description and purpose

For improved safety reasons peripheral controls (ACP, patient hand control, siderail controls and Mobilift) have been fitted with RC components. These allow the control box to recognise whether a circuit activation is a valid press of a button or a short circuit. In such a case, the function is blocked as protection against a short circuit. Short circuit protection only works when all controls are fitted with RC components and the function is activated in the control box.

All Multicare beds with serial number 2014xxxxxxx and higher have short-circuit detection turned on by default.

All control units are equipped with switching on or off of the short-circuit detection function. Switching can be achieved using the ACP.

NOTES:

- Peripheral controls which **are** equipped with an RC circuit for short-circuit detection **are** compatible with control units with short-circuit detection turned ON or OFF.
- Peripheral controls which **are not** equipped with an RC circuit for short-circuit detection **are not** compatible with control units with short-circuit detection turned ON and it is necessary to turn this function off in the control unit.
- If there is one peripheral component which is not equipped with short-circuit detection (does not have an ST or KA {SN 2014 and higher} mark on the ACP; or ST on the handset) it is necessary to turn off the short-circuit detection.
- If the function is controlled by data transfer (head siderail, undercarriage module), then short-circuits are not detected.

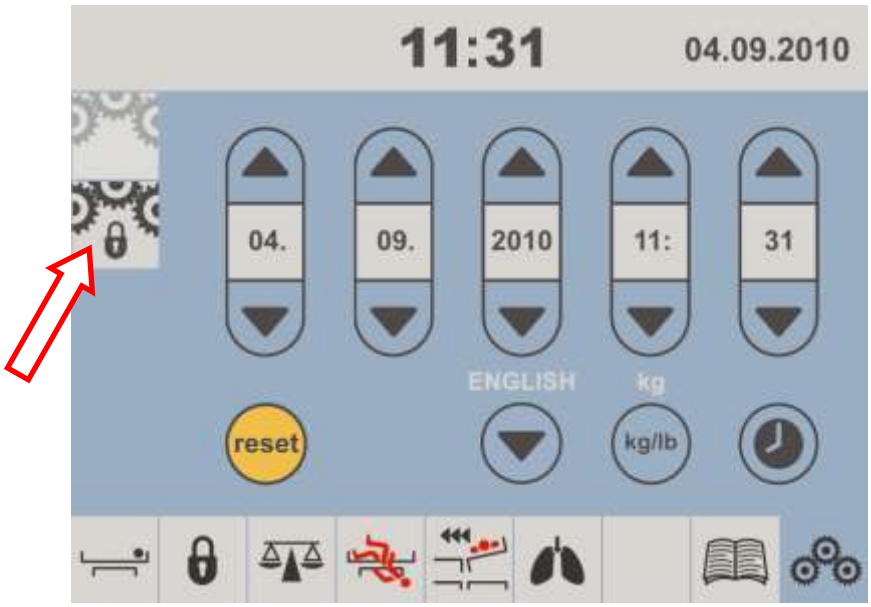
COMPATIBILITY IDENTIFICATION

Part	Label	Short-circuit detection
Bed Multicare	SN: 2014…	Default: Turned on
ACP	ST	Compatible with short-circuit detection
Handset	KA (for SN 2014 and higher) -or- ST	Compatible with short-circuit detection

5.7.2 Activation / deactivating short circuit detection on the LCD panel

- To access the short circuit switching mode, press the service button.

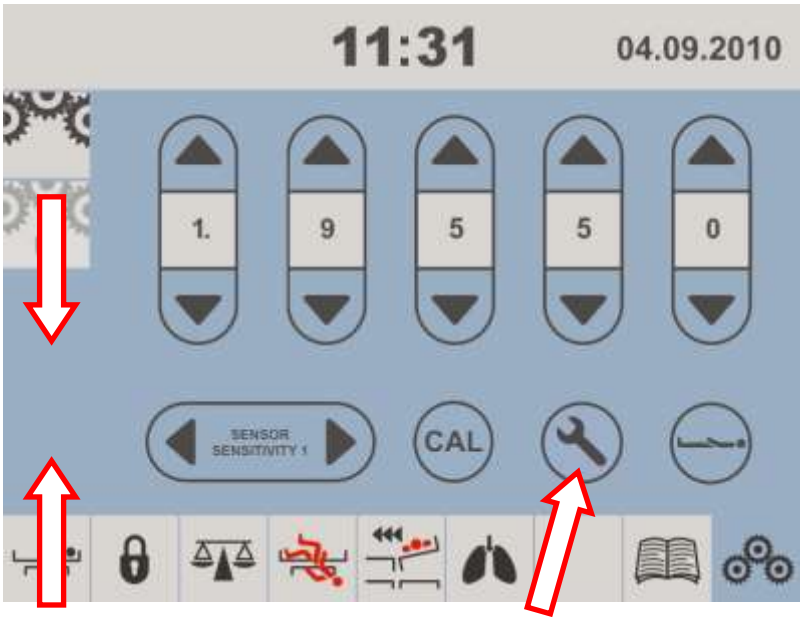
- Switch to the service mode.



- Log in to the service mode by entering the log-in code.
- Enter the 5-digit code which is composed of the last numbers of the date and time.
- Press the green enter button.

4. 5. 1. 2. 3. (example 49011)

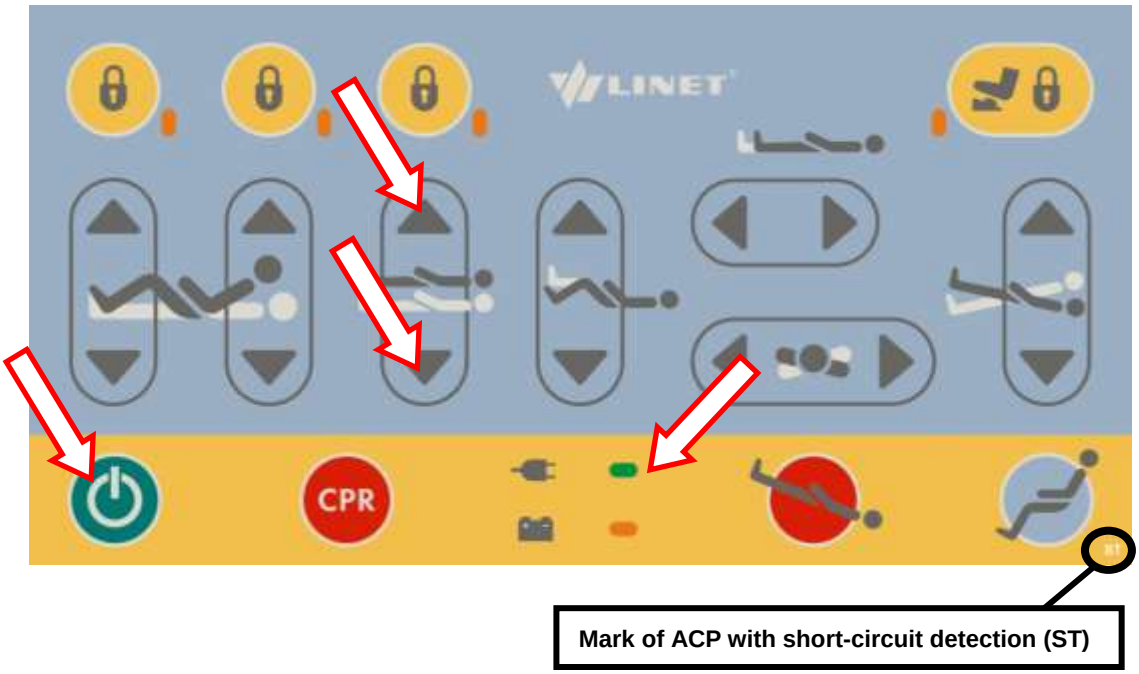
- Press the service mode button
- Hold the button for at least 5 seconds until the count down bar disappears and a sound signal occurs.



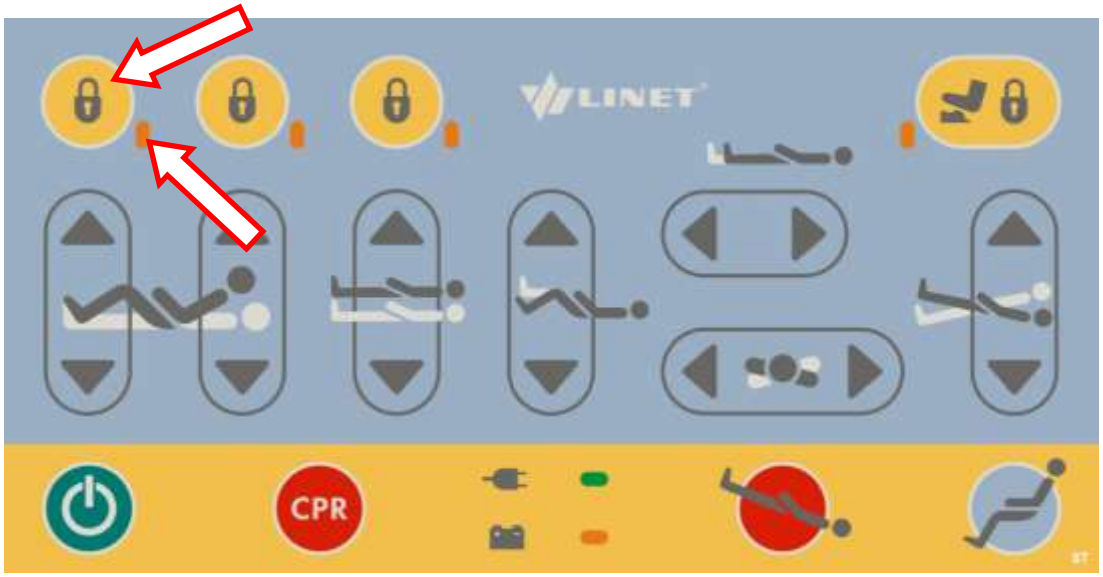
- To confirm that the bed is in service mode, the green LED on the LCD flashes quickly.
- To switch the RC circuit, press the **leg rest lock** button
- Short-circuit detection is switched **ON** when the leg rest lock is **not lit.**
- Short-circuit detection is switched **OFF** when the leg rest lock is **lit.**
- This mode is active for a duration of 5 mins.

5.7.3 Activating / deactivating short-circuit detection on the ACP

- To enter short-circuit detection switching mode:
- Activate the ACP by pressing the **GO** button. Then press **mattress platform UP** + **DOWN** + **GO** simultaneously for 5s.
- The LED mains power indicator will start blinking and an acoustic signal will be heard.



- Switching is achieved using the **leg rest lock** button
- Short-circuit detection is **ON** when the leg rest lock **is not lit.**
- Short-circuit detection is **OFF** when the leg rest lock **is lit.**



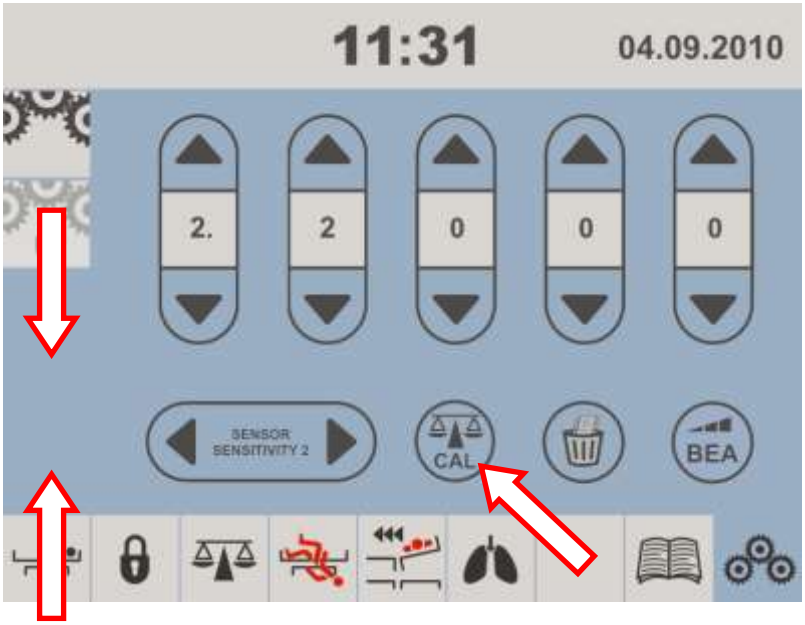
5.8 Calibration of multizone bed exit alarm

- Press the „settings“ button on the Multiboard panel.

- Switch to the service mode

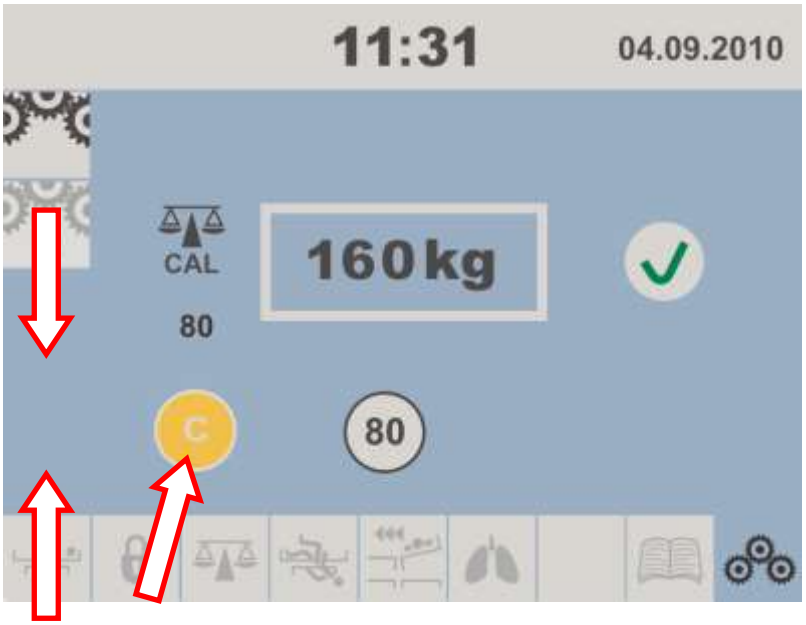
- Log in to the service mode by entering the log-in code
- Enter the 5-digit code which is composed of the last numbers of the date and time.
- Press the green enter button.

- Press the button for scale calibration.
- Hold the button for at least 5 seconds until the count down bar disappears and a sound signal occurs.



- Calibraton of multizone bed exit alarm is performed by pressing the green enter button. Before pressing the enter button, it is necessary for the bed to be empty and in a horizontal position.

- Calibraton of multizone bed exit alarm is done. Press cancel button for exit.



5.9 Calibrating the i-Drive Power® accelerometers

It is necessary to calibrate the i-Drive Power® accelerometer after any service intervention. The bed must be on a level floor. This can be checked using the spirit level on the head end of the bed.

Calibrate i-Drive Power® as follows:

- Ensure the bed is on a level floor!
- In case the i-Drive Power® system is not activated, activate it by pressing the activation button on the undercarriage.

- Activate the wheel at the head end of the bed so it lowers into the working position.

- Press and hold the **FWD** and **REV** buttons simultaneously for 5s.
- Dont touch „Safety sense“ sensor by hand

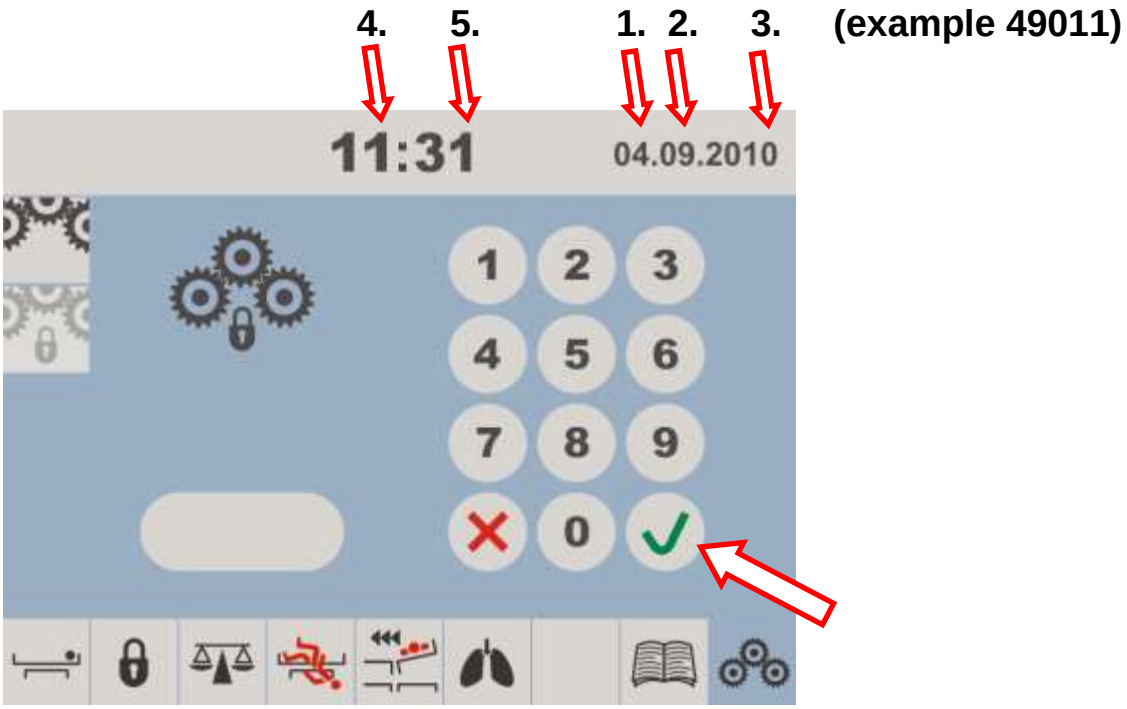
- Hold the buttons **FWD** and **REV** and the system will enter the accelerometer calibration mode. The battery status LED will be turned off.
- The battery status LED will flash and a tone will be heard.
- Release the **FWD** and **REV** buttons.
- The i-Drive Power® accelerometer has been succesfully calibrated.

6 Scale Calibration

- Press the „settings“ button on the Multiboard panel.

- Switch to the service mode

- Log in to the service mode by entering the log-in code
- Enter the 5-digit code which is composed of the last numbers of the date and time.
- Press the green enter button.



Scale calibration is always needed when:

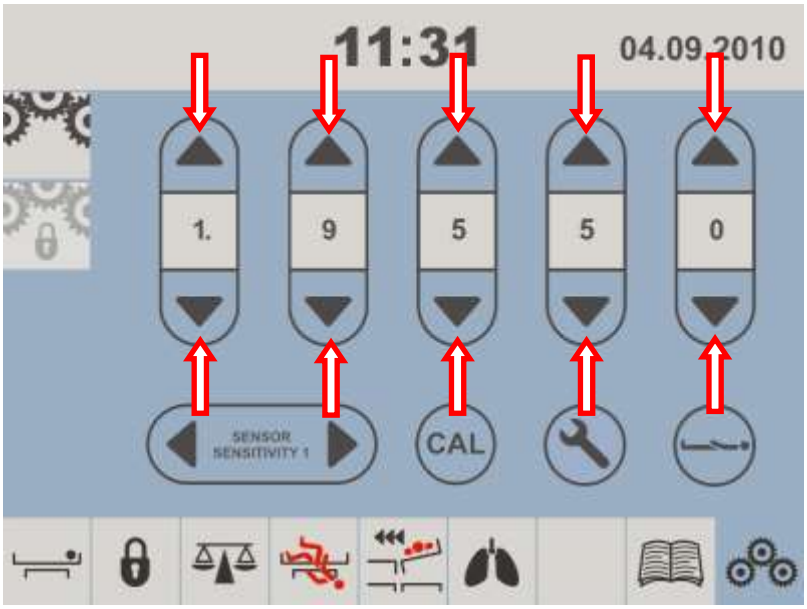
a) the scale module is replaced.

b) any of the tensometers is replaced.

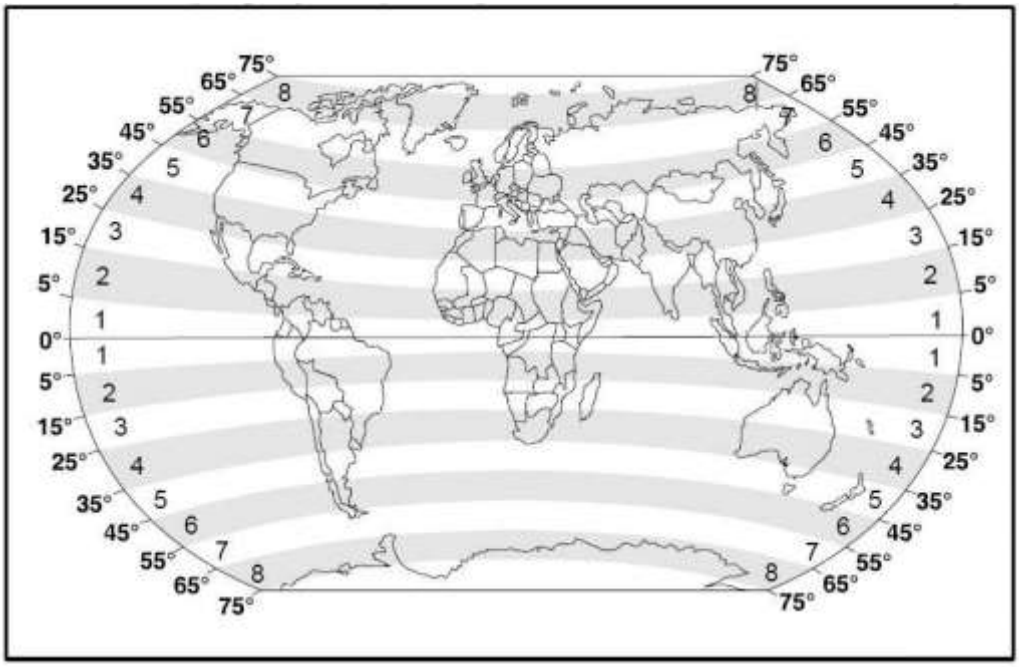
The gravitational constant, according to the bed's location and values (voltage) of the tensometers, must be set and then the bed calibrated when replacing the scale module.

The values (voltage) of the replaced tensometers must be set and then the bed calibrated when replacing a tensometer.

- Setting tensometer values

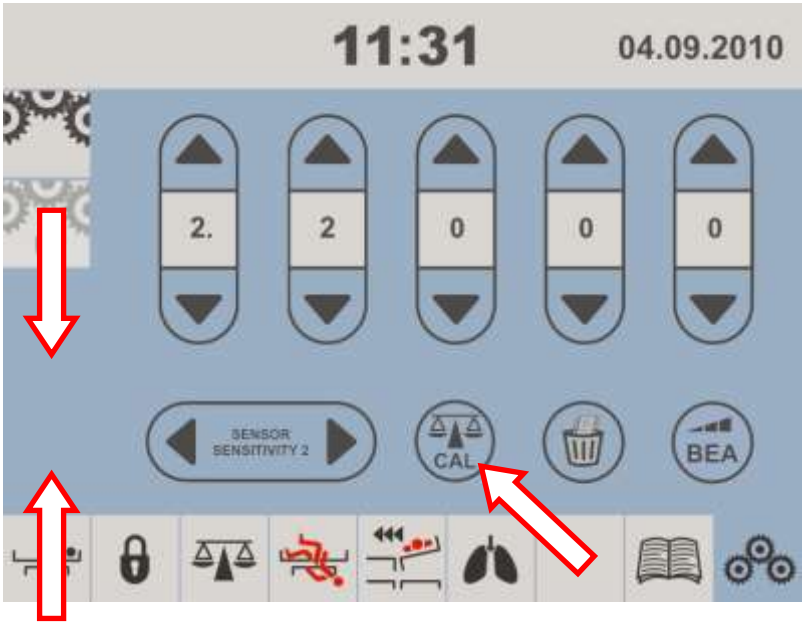


- Setting the gravitational constant
- The gravitational constant must be set at the constant where the bed is calibrated. After calibration it can be changed to the constant of the area where the bed is going.



1	5° - 5°	5	35° - 45°
2	5° - 15°	6	45° - 55°
3	15° - 25°	7	55° - 65°
4	25° - 35°	8	65° - 75°

- Press the button for scale calibration.
- Hold the button for at least 5 seconds until the count down bar disappears and a sound signal occurs.



It is necessary to perform each step according to the manual when calibrating the scale:

- Factory zero
- Scale calibration at 160 kg (alternatively 80kg)
- Saving the calibration constant to memory.

6.1.1 Factory zero

- Factory zero is performed by pressing the green enter button. Before pressing the enter button, it is necessary for the bed to be empty and in a horizontal position.

6.1.2 Scale calibration

- Choose the preferred load for scale calibration (80 or 160kg).
- Equally place the weights on the bed as shown below and press the green enter button.

6.1.3 Saving the calibration constant to memory

- To save the calibration constant to memory, press the ,,M“ button.

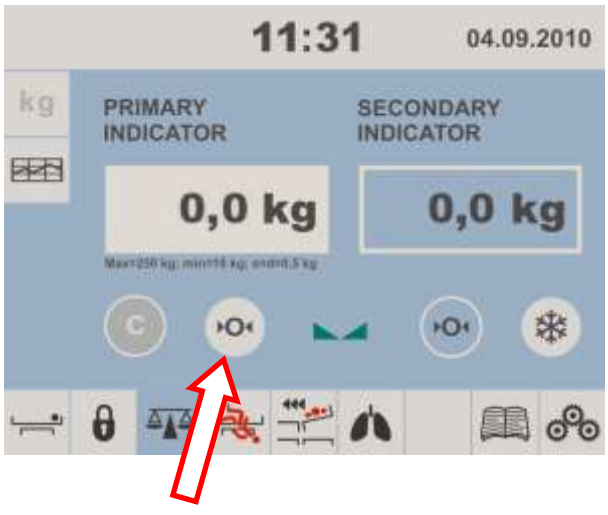
6.1.4 Reconfiguring the sensor constants

6.1.4.1 Location of the tensometers on the bed

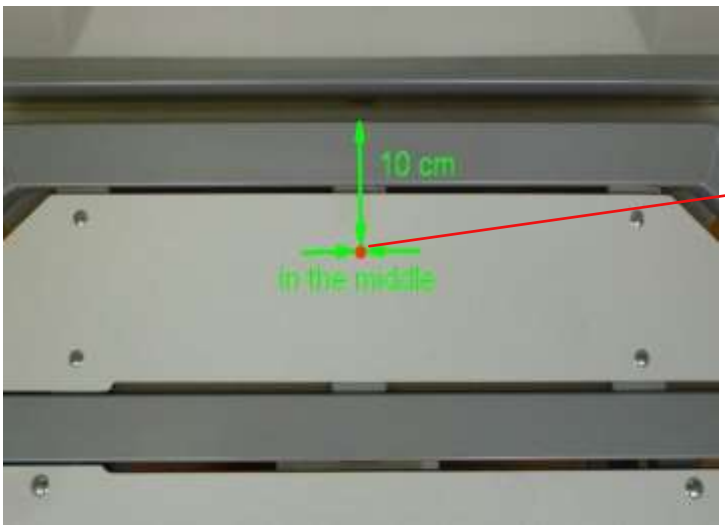
No.1. Head left
No.2. Head right
No.3. Foot left
No.4. Foot right

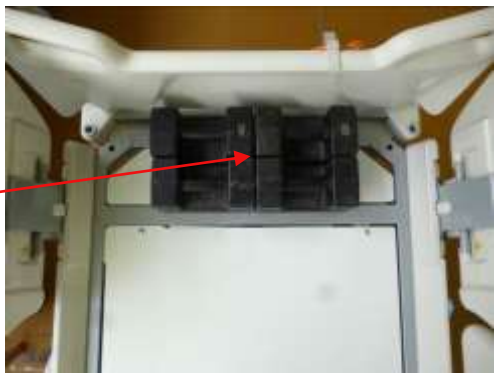
6.1.4.2 Zeroing the scale

- Zero both displays while the bed is unoccupied.
- Before placing the weights on the bed, it is necessary to check that the display is zeroed.



6.1.4.3 Positioning the weights for sensors 1 and 2 (head end sensors)





6.1.4.4 Calculating and saving the new sensor constant - sensor 1:

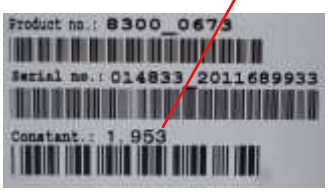
- sensor 1:
- divide the secondary indicator value by two

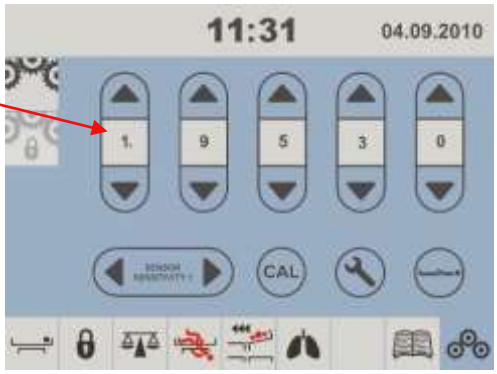
79,5 : 2 = 39,75

$$\frac{\text{half of the value of the secondary display}}{\text{half of the value of the weights used (40kg)}} \times \text{sensor 1 constant} = \text{new constant}$$

Write the new constant value to the position of sensor 1

$$\frac{39.75}{40} \times 1.953 = 1{,}940$$





6.1.4.5 Calculating and saving the new sensor constant - sensor 2:

- sensor 2:
- divide the secondary indicator value by two

79,5 : 2 = 39,75

half of the value of the secondary display
half of the value of the weights used (40kg)

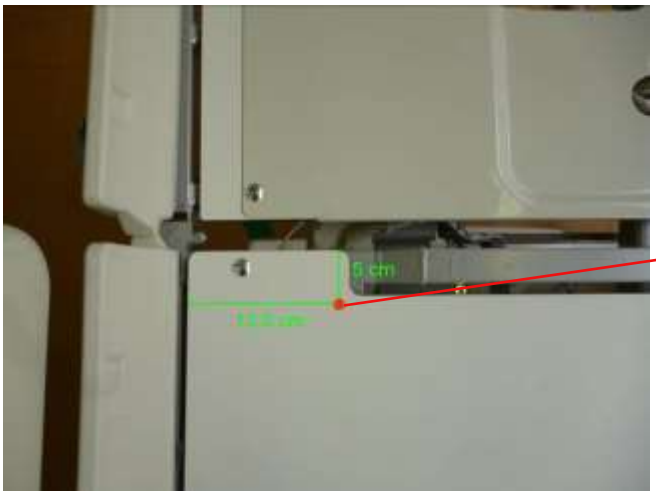
x sensor 2 constant = new constant

Write the new constant value to the position of sensor 2

39.75
40

x 1.953 = 1,940

6.1.4.6 Positioning the weights for sensor 3 (left foot sensor)



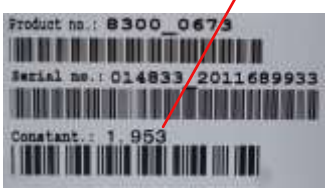
6.1.4.7 Calculating and saving the new sensor constant - sensor 3:

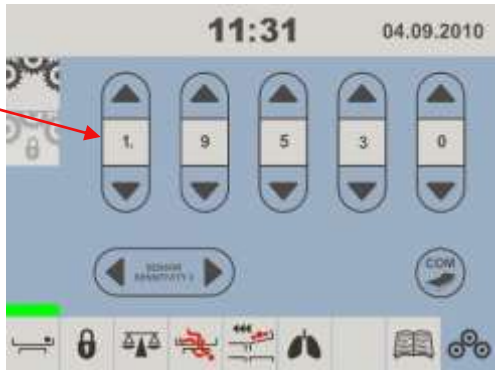
- sensor 3:
- check the value on the secondary indicator

$$\frac{\text{value of secondary display}}{\text{value of weights used (80kg)}} \times \text{sensor 3 constant} = \text{new constant}$$

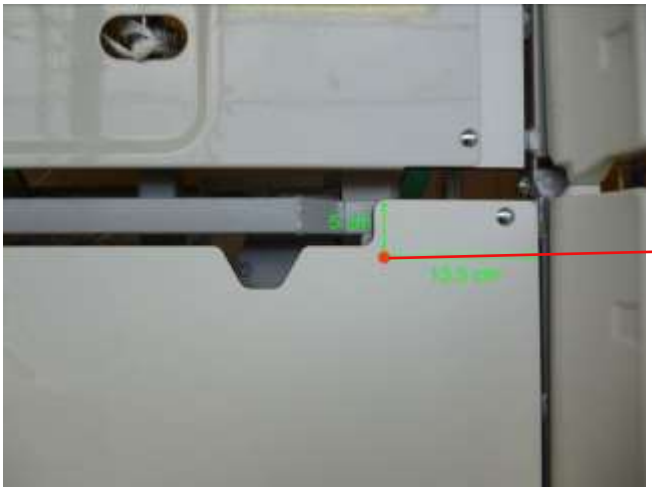
Write the new constant value to the position of sensor 3

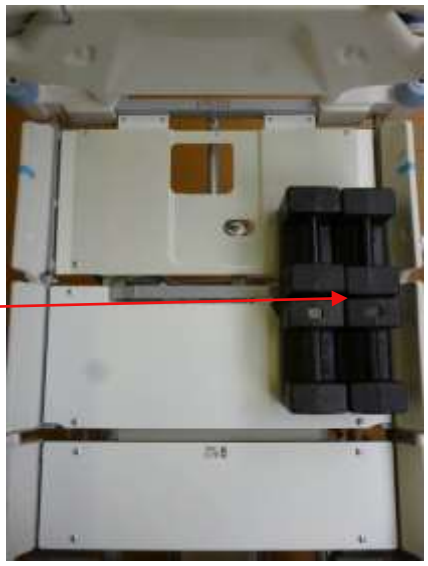
$$\frac{79,5}{80} \times 1.953 = 1,940$$





6.1.4.8 Positioning the weights for sensor 4 (right foot sensor)





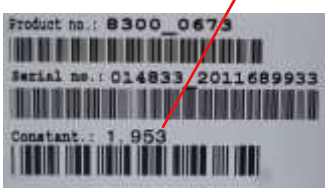
6.1.4.9 Calculating and saving the new sensor constant - sensor 4:

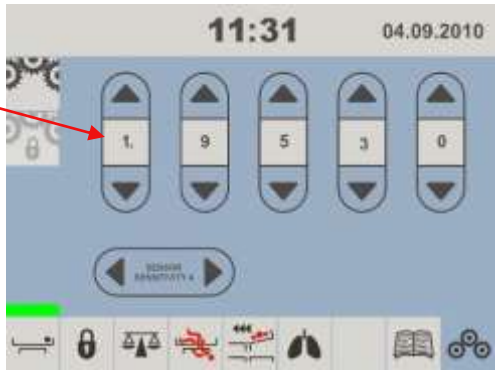
- sensor 4:
- check the value on the secondary indicator

value of secondary display / value of weights used (80kg) x sensor 4 constant = new constant

79,5 / 80 x 1.953 = 1,940

Write the new constant value to the position of sensor 4



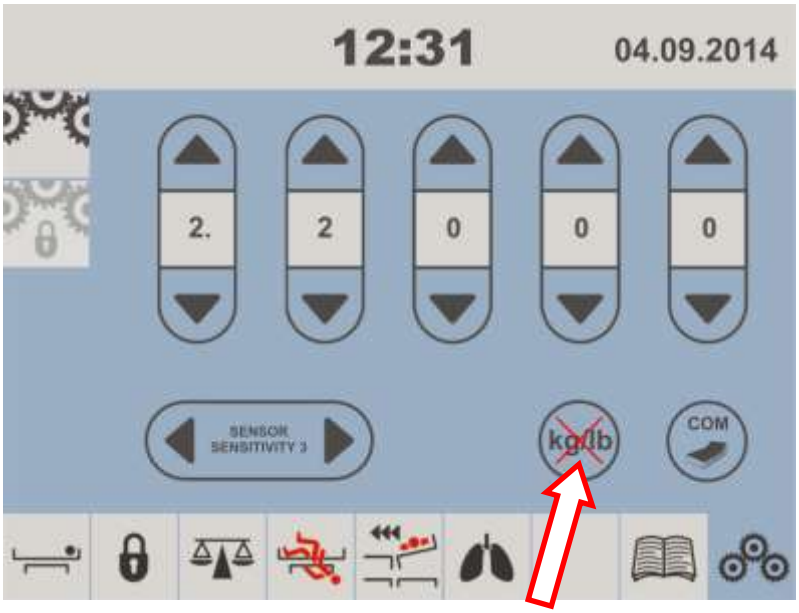


6.1.5 Switching between kg/lb

Beds with the serial number 2014xxxxxx and higher can not be switched between kg and lb.Weighing in kg is set by default. Switching between kg/lb is only allowed on beds for the U.S. market.

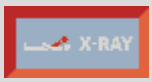
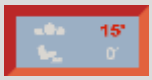
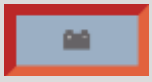
To allow switching between kg and lb:

- Open the third page of the service menu (Sensor Sensitivity 3).
- Press the **kg/lb** button, which is crossed out by default (see picture below).
- It is possible to switch between weighing in **kg** or **lb**.



7 Errors – Failure States

7.1 Pop ups

Pop-Up	Meaning	Action required
	Function locked	Activate function by unlocking respective lock
	X-Ray cassette holder not inserted correctly	Insert X-Ray cassette holder correctly
	Activation required	Press GO button to activate keypad or touchscreen
	Siderails folded down – lateral tilt disabled	Fold up siderails to enable adjustment of lateral tilt
	Prevention of collision of bed and floor in tilted position	Shorten mattress platform or lower calfrest
	Horizontal position reached during tilting of bed	Press respective button or icon to continue tilting
	Lateral tilt adjustment by foot control – max. 15°	No action required - information only
	Backrest angle adjusted above 30° - Lateral tilt is limited to 15° Lateral tilt is adjusted more than 15°- backrest angle is limited to 30°	Lower backrest to an angle of less than 30° to adjust lateral tilt to an angle of more than 15° Adjust lateral tilt to an angle less than 15° to raise the backrest to an angle of more than 30°
	Maximum load of exceeded	Remove weight
	Bed loaded with more than 150 kg – Lateral tilt only possible to 15°	No action required – information only
	Function can not be activated when running on battery.	Connect bed to mains
	Patient transfer is activated (Lateral tilt only possible to 15°)	No action required – Information only
	Automatic lateral therapy is running. Positioning of bed is disabled.	Stop automatic lateral therapy to enable positioning of bed.
	A potentiometer has malfunctioned	Service or replacement of column unit neccesary
	Function stopped due to possible collision in lateral tilt.	Level the bed by continuing to press the same button or manually (see …..)
	Malfunction of bed movement protection after perfoming one movement.	Service needed or replacement of electrical parts of bed.

7.2 Error codes

Code 1: System fault during standard mode
Code 2: System fault during ALT (Automatic lateral therapy)

7.3 Overheated main control box

If the temperature of the heat sink in the main control box reaches:
85°C /185°F – The battery charging function disconnects.
100°C / 212°F – The battery charging function disconnects, sound signalization occurs and 1 is added to LINIS (see LINIS chapter 7.1 – page 3)
115°C / 239°F – The bed stops functioning and sound signalization occurs.
The bed becomes functional again after the main control box cools down.

7.4 Power box overheating

If the transformer in the main control box reaches:
100°C / 212°F – The main control box automatically turns off and turns on automatically after cooling.
130°C / 266°F – The heat fuse blows. It is necessary to replace the main control box.

7.5 One fault state

When the mains LED flashes, this signalises protection from one fault. In this state, only one bed movement is possible and after this movement all functions will be blocked. This is indicated by all lock LEDs flashing.

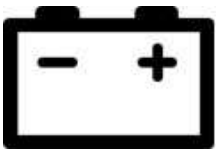
8 Routine maintenance visual checks & performance test

P	Picture	Action	Tools
Bed frame		**Bed identification** Write the bed serial and model numbers onto the preventative check report.	N/A
Undercarriage		**Checking the welds** Visually check the welds on the whole undercarriage.	N/A
Undercarriage		**Checking the tightnesss of the fixings** Visually check all screw connections on the whole undercarriage. Check the screws on all four castors – tighten loose screws using the specified tool.	Torque wrench
Undercarriage		**Checking the function of the bed's braking system** Check the brake function on each castor (red lever down) – Castor wheel rotation and castor swivelling should be locked. Check the neutral function on each castor (lever horizontal) - Castor wheel rotation and castor swivelling should be unlocked. Check the steering lock function - 3 castors unbraked , steering castor locked in the forward direction, castor wheels unbraked. (green lever down. MC version without 5th castor).	N/A
Undercarriage		**Checking the castor wheel rotation** Move the bed 1m in various directions while the brake is in the neutral position. Check each castor for smoothness of motion and lack of noise.	N/A
Undercarriage		**Checking the COK (brake) levers** Check the tightness of the COK (brake) levers	Allen key
Undercarriage		**Checking the column screws** Check the tightness of the screws which connect the columns to the column clamp. Tighten the screws with the appropriate tool to 10Nm. Check the tightness of the screws which connect the column clamp to the undercarriage frame.	Torque wrench Allen key Socket set

Undercarriage		**Checking the night light** Connect the supply cable to mains electricity. Visually check the function of the light.	N/A
Undercarriage		**Checking electrical wiring** Visually check all groups of cables on the bed undercarriage. Check that the plastic trunking is securely fixed and that the covers are closed. Check that the cables are correctly secured with cable ties.	N/A
Undercarriage		**Checking the main power cable** Visually check the complete main cable. Check that the cable gland is securely fixed to the bed frame.	N/A
Undercarriage		**Checking the ibrake system** Check the function of the ibrake after connecting the supply cable (Check the function from the braked position and steering-lock position). Check that the brake functions correctly (red lever downwards) – (Castor wheel rotation and castor swivelling should be locked).	N/A
Undercarriage		**Checking the 5th castor system** Check that the 5th castor raises (when the green lever is up) and lowers (when the green lever is down) to the end position under battery power Check that the castor raises when the bed is connected to mains power.	N/A
Undercarriage		**Checking the iDrive Power** Check that the i Drive Power lowers (press ON button) and raises (press OFF button) to the end position under battery power . Check that iDrive is charging when the bed is connected to mains power. Check the driving with iDrive Power. Check the wheel tread, if not damage. Check the torque of the nut fixing the wheel (25 + 3Nm)	Torque wrench
Patient surface		**General visual check of patient surface parts** Check these parts: frame, HPL parts, siderails, siderail mechanisms, head and foot bed ends, other parts. Check the surface finish (paintwork). Check the welded connections.	N/A

Patient surface		**Checking electrical wiring** Visually check all groups of cables on the patient surface. Check that the plastic trunking is securely fixed and that the covers are closed. Check that the cables are correctly secured with cable ties.	N/A
Patient surface		**Checking fixations on the patient surface** Visually check all screw connections.	N/A
Patient surface		**Checking the column screws** Check the tightness of the screws which connect the columns to the patient surface. Tighten the screws with the appropriate tool to 10Nm.	Allen key
Patient surface		**Checking the siderail screws** Check the tightness of the screws which connect the siderails to the siderail mechanisms. Tighten the screws with the appropriate tool to 7Nm.	Torque wrench
Patient surface		**Checking the moving parts** Check the parts visually and check the function of the moving parts: (back rest, thigh rest, calf rest, bed extension, siderail locking, bed end locking, X-ray cassette, etc.). If necessary, lubricate all surfaces in contact under friction with the appropriate product.	BioFluid
Controllers		**Checking the functions from all controls** ACP, handset, Mobilift, foot controls, siderail controls etc. Check all buttons on all controls (including the GO and STOP buttons). Check all functions on all controls (movement, lock functions). Check the function of the siderail limit switches. Check the function of the extension limit switch. Check the function of the back rest and calf rest angle accelerometers.	N/A

Controllers		**Checking the function of the LCD** Check all buttons (including the GO and STOP buttons). Test the bed exit function. Test the transfer function. Test the ALT function. Test all other functions on the LCD. Test the lock functions.	N/A
Actuators		**Checking the functions of all actuators** Columns, back rest, thigh rest, calf rest and bed extension actuators. Check actuator movement to full extension/retraction. Check the sychronisation of the columns. Check the actuators subjectively for vibration and noise. Check the actuator pins and starlocks.	N/A
Bed systems		**Checking the weighing system** Check that the cables between the weighing frame and non-weighing frame are positioned correctly. Check the zero setting. Check that measurement is correct using calibration weights.	Calibration weights
Bed systems		**Checking the Nurse Call system** Connect the Nurse Call to the hospital's system and check the function.	N/A
Bed systems		**Checking the mechanical unblocking of the back rest CPR** Visually check the unblocking mechanism, the cable sleeve and fixing screws. Test the mechanical unblocking from the highest position of the back rest. **Malfunction or deterioration of the unblocking function:** Adjust the setting screw – cable sleeve length Lubricate the actuator piston with the appropriate product.	Biofluid
Bed systems		**Checking the X-ray cassette** Check that the X-ray cassette slides in and out correctly. Visually check the X-ray cassette and accessories. Test the function of the end switch (partly slide out the cassette and check that back rest can't be raised).	N/A

Battery		**Battery** Test the battery functions. Test the internal resisitance of the battery. Replace the battery after two years.	N/A
Electrical		**Electrical test** Electrically test the bed according to the appropriate standards. Write the results to the preventative check report.	
Label		**Placing the preventative check sticker on the bed** Place the LINET sticker on the foot end crossbar and make a note of the date of the next preventative check (1 year).	
Report		**Complete the preventative check report**	Preventative check report

Periodic Preventative Maintenance protocol

LINET

The protocol for periodic safety technical inspection.

Bed serial number:		**Bed model number:**	
Customer:		**City:**	

Operation	Visual Checks √	Test Function √	Fault Detection	
			YES	NO
welds	☐	N/A	☐	☐
tightnesss of the fixings castors	☐	☐	☐	☐
function of the bed's braking system	☐	☐	☐	☐
castor wheel rotation	☐	☐	☐	☐
COK (brake) levers	☐	☐	☐	☐
column screws - undercariage	☐	☐	☐	☐
night light	☐	☐	☐	☐
electrical wiring	☐	☐	☐	☐
main power cable	☐	☐	☐	☐
ibrake system	☐	☐	☐	☐
5th castor system	☐	☐	☐	☐
general visual check of patient surface parts	☐	☐	☐	☐
electrical wiring	☐	☐	☐	☐
fixations on the patient surface	☐	☐	☐	☐
column screws – patient surface	☐	☐	☐	☐
siderail screws	☐	☐	☐	☐
moving parts	☐	☐	☐	☐
functions from all controls	☐	☐	☐	☐
function of the LCD	☐	☐	☐	☐
functions of all actuators	☐	☐	☐	☐
weighing system	☐	☐	☐	☐
Nurse Call system	☐	☐	☐	☐
mechanical unblocking of the back rest CPR	☐	☐	☐	☐
X-ray cassette	☐	☐	☐	☐
battery	☐	☐	☐	☐

Electrical Test (measurement according to the norms in the country)				
		measured	allowed	unit
earth leakage current	normal condition		0,50	mA
	single fault		1,00	mA
insulation test.			>2.000	MΩ
earth bond test.			0,3	Ω

Replaced spare part number(s) / action made on the bed:

Results: The bed passed the service inspection and can be returned to use:

☐ YES ☐ needs to be repaired ☐ NO

Date: _____ Validity expires on: _____

Checked done by	Name	Signature

9 LINIS

9.1 Description of Linis items displayed on LCD (Multiboard)

	Page 1				
1	AD P Col 0	*AD potentiometer column 0*	1	AD Accel X	*AD accelerometer PCB x*
2	AD P Col 1	*AD potentiometer column 1*	2	AD Accel Y	*AD accelerometer PCB y*
3	AD P Col 2	*AD potentiometer column 2*	3	AD Accel BR	*AD backrest accelerometer*
4	AD I Col 0	*AD current - column 0*	4	AD Accel LR	*AD thighrest accelerometer*
5	AD I Col 1	*AD current - column 1*	5	AD Temp	*AD temperature*
6	AD I Col 2	*AD current - column 2*	6	AD Stop	*AD stop*
7	AD I Mot BR	*AD backrest motor current*	7	AD RE+	*AD RE+*
8	AD I Mot LR	*AD legs motor current*	8	AD UM	*AD Batje*
9	AD Accu U	*AD battery Ud*	9	AD 12V	*AD 12V*
10	AD Accu I	*AD battery Id*	10	AD 5V	*AD 5V*
11	Oper Code	*Operation codes* ***(see 9.3)***	11	Charge Stat	*Charging regime*
12	Stop Code	*Bed stop code* ***(see 9.2)***	12	System Err	*System fault* ***(see 7.2)***
	Page 2				
1	C Accel x	*Accelerometer PCB x*	1	Time Mot 0	*Engine movement time 0*
2	C Accel y	*Accelerometer PCB y*	2	Time Mot 1	*Engine movement time 1*
3	C Accel BR	*Backrest accelerometer*	3	Time Mot 2	*Engine movement time 2*
4	C Accel LR	*Thighrest accelerometer*	4	Time Mot 3	*Engine movement time 3*
5	C Col Top	*Column upper limit*	5	Time Mot 4	*Engine movement time 4*
6	C Col 0 Diff	*Column correction 0*	6	Time Mot 5	*Engine movement time 5*
7	C Col 1 Diff	*Column correction 1*	7	Time Mot 6	*Engine movement time 6*
8	C Col 2 Diff	*Column correction 2*	8	Time Move	*Bed movement time*
9	C Charge 1	*Charging level 1*	9	End Switch	*End switches location*
10	C Charge 2	*Charging level 2*	10		
11	C Accu Corr	*Charging correction*	11		
12	PB SW Ver	*Sw version PB*	12	DU SW Ver	*Sw version of display*

Page 3					
1	Oload F	*Force overloads number*	1	Scale C1	*Tensometer constant 1*
2	Oload 260V	*Overstrain number > 260V*	2	Scale C2	*Tensometer constant 2*
3	Oload 280V	*Overstrain number > 280V*	3	Scale C3	*Tensometer constant 3*
4	Oload MaxV	*Max. overstrain value*	4	Scale C4	*Tensometer constant 4*
5	Oload T>2	*Duty cycle exceeded*	5	Scale CG	*Gravitational constant*
6	Oload T>4	*Duty cycle exceeded*	6	Scale CCal	*Calibration constant*
7	Oload T>8	*Duty cycle exceeded*	7	Scale NoCal	*Number of calibrations*
8	Oload T>12	*Duty cycle exceeded*	8	Scale Graph	*Scale value saving*
9	Oload T>16	*Duty cycle exceeded*	9	Scale T1	*Tensometer value 1*
10	Oload Temp	*Heat overload value* ***(see 7.3)***	10	Scale T2	*Tensometer value 2*
11	Angle LR	*Calfrest angle*	11	Scale T3	*Tensometer value 3*
12	Time Sec	*RTC seconds*	12	Scale T4	*Tensometer value 4*

Chart 1 — *LINIS code chart as shown on LCD in siderails.*

9.2 Stop codes

Stop codes	
Code	**Reason**
1	*unexpected lateral tilt detected by main control box motherboard accelerometer*
2	*foot control pressed after STOP*
3	*display button pressed after STOP*
4	*two buttons pushed simultaneously longer than 1 second*
5	*keyboard not released after system start*
6	*main control box temperature exceeded*
7	*column current overload 0*
8	*column current overload 1*
9	*column current overload 2*
10	*actuator current overload – backrest*
11	*actuator current overload – thighrest*
12	*stopped due to resistance on the same function*
13	*short circuiton on analog control (RC detection)*
101	*GO button not active*
102	*locked function*
103	*x-ray cassette inserted incorrectly*
104	*siderails folded down during lateral tilt*
105	*backrest angle greater than 30° during lateral tilt*
106	*lateral tilt stopped at 15° when using foot control*
111	*function blocked during one fault state*
112	*function blocked during active ALT*
113	*stopped due to risk of collision when bed is tilted*
114	*stopped in zero position*
115	*collision when exceeding threshold limit of calfrest and footrest*
116	*scale overload – tilt only to 15°*
121	*column potentiometer defect*
122	*stopped at 15° during lateral movement patient transfer*
123	*absolute scale overload*
124	*starting or running ALT on battery*

See LINIS: page 1, STOP CODES

9.3 Operation codes

Operation codes	
Code	**Function**
0	*Autocontour – up*
1	*Calfrest – up*
2	*Autocontour – down*
3	*Lateral release*
4	*Examination position*
5	*Lock – legs*
6	*Lock – central*
7	*Lock – backrest*
8	*Lock – height adjustment*
9	*Lock - pedals*
10	*Thighrest – up*
11	*Calfrest - down*
12	*Thighrest - down*
13	*Trendelenburg*
14	*Backrest to 30°*
15	*Backrest - up*
16	*CPR*
17	*Backrest - down*
18	*Anti-Trendelenburg*
19	*Mobilisation position*
20	*Height adjustment – up*
21	*Cardiac chair position*
22	*Height adjustment - down*
23	*GO*
24	*GO*
25	*Lateral tilt – left*
26	*CPR Trendelenburg*
27	*Lateral tilt – right*
28	*Mattress platform – extension*
29	*Mattress platform – shortening*
30	*No function is activated*
31	*Ineffective function (eg: two buttons pressed at once)*
32	*Simultaneous GO*
33	*Straightening therapy*
34	*Bed calibration*
35	*Column 0 up*
36	*Column 1 up*
37	*Column 2 up*
38	*Column 0 down*
39	*Column 1 down*
40	*Column 2 down*
41	*Bed calibration*
42	*Patient reset*
43	*Eeprom service delete*

See LINIS: page 1, OPER CODE (operation function)